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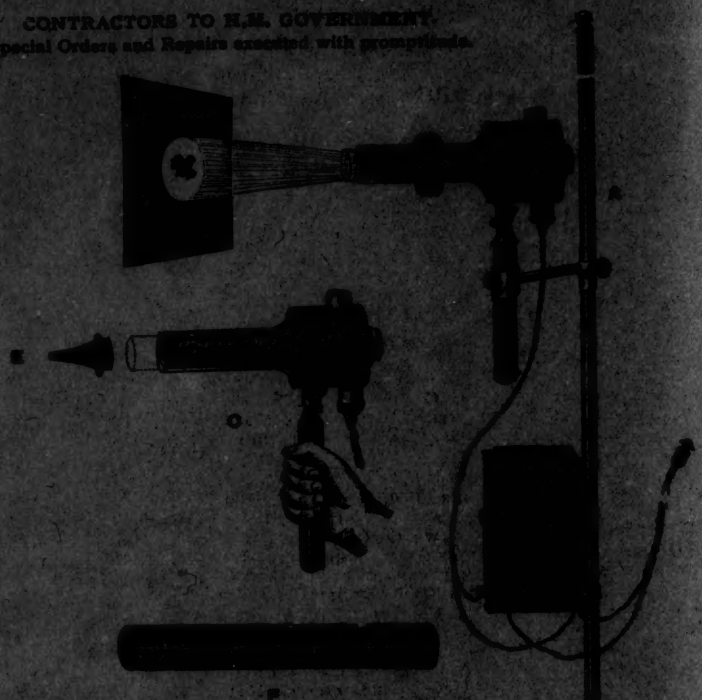

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THE BRITISH JOURNAL

OF

OPHTHALMOLOGY

MARCH, 1925

COMMUNICATIONS

TINTS AND THEIR VALUE*

BY

SIR ARNOLD LAWSON, K.B.E., F.R.C.S.

LONDON

THE subject of tints has become rather a prominent one of recent days. A great deal has been written—some reasonably, some unreasonably—about ultra-violet rays and their destructive effects on human eyes. Mainly, I think, owing to the energy with which the optical trade has run excursions and alarums, the general public has become to a large extent imbued with a haunting fear of daylight, and the wearing of lenses which eliminate the ultra-violet rays has become the fashion. Like all fashions, the reasonableness has been largely lost in unreasonableness; the desirability of protection for some has become merged in a totally undesirable wish for protection by a large body of the healthy public, a desire fostered by ignorance, and maintained, to a large extent, by advertisements calculated to bring monetary profit to those who advertise. Further, a great deal of confusion seems to have arisen with regard to tints themselves. They seem to me, in a very large number of cases, to be prescribed in a kind of indiscriminate and indefinite way, without any special reference to anything in particular. Especially, I suppose, it is due to the

*The Presidential Address delivered before the Section of Ophthalmology, Royal Society of Medicine, Nov., 1924.

bugbear of ultra-violet rays, which seems to have induced, in some minds, an uncontrollable desire to order Crookes' glass for all sorts and varieties of patient, whether healthy or unhealthy, and no matter what the condition of their eyes may be; and simply because the tint is said to produce a feeling of comfort and refreshment.

For these reasons I think this is a good opportunity to make an attempt to clear up the matter of the value attaching to the wearing of tinted glasses.

I fear that the subject, as I shall present it, may give rise to a certain amount of controversy, but at any rate I am, like you, a seeker after truth, and if my version of this estimable virtue as regards the use of tinted glasses leads to a clearer outlook, that is as much as I can or do expect.

What is the real truth about the human eye and its susceptibility to ultra-violet rays? To examine this point, I must traverse, briefly, some well-known ground. Assuming the acceptance of the wave theory of light, it is known that the visible spectrum extends, roughly, from waves of light of 700 $\mu\mu$ wave-length at the red end, to 400 $\mu\mu$ wave-length at the violet end, or, in some people, to 380 $\mu\mu$. Beyond the visible spectrum are the infra-red (or heat) rays, which produce a rise in temperature, whilst beyond the violet end extend the ultra-violet rays, which cause harmful chemical action. Now, whilst there is no direct protection from the luminous and infra-red rays, which pass almost unimpeded to the retina, there is, on the other hand, a great deal of direct protection given by Nature against the ultra-violet rays. It has been found by experiment that this protection is furnished by the cornea and by the crystalline lens, and especially by the latter. The cornea absorbs all waves of shorter wave-length than about 290 $\mu\mu$, whilst the lens is impervious to ultra-violet rays of a shorter wave-length than 350 $\mu\mu$. Thus only ultra-violet rays of wave-lengths between 400 $\mu\mu$ and 350 $\mu\mu$ normally reach the retina. Now, in various ways the ultra-violet radiation has been traced, in the laboratory, to waves of about 20 $\mu\mu$ wave-length, so it is obvious that only a very small proportion of possible ultra-violet radiation can reach the retina under normal conditions. Ordinary sunlight, that is, the sunlight of the lower altitudes, is, as a matter of fact, rather poor in ultra-violet rays, and contains few of shorter wave-length than 350 $\mu\mu$. All the ultra-violet waves of shorter wave-length than these are stopped by vapour and the density of the atmosphere. Thus the eye is constructed so as to allow the ultra-violet rays of ordinary sunlight to pass unimpeded to the retina, whereas all excess of ultra-violet radiation beyond what is present in ordinary sunlight, is excluded by the natural protective qualities of the eye. So again, protection from the

heat radiation proceeding from the red end of the spectrum is to some extent afforded by the absorptive properties of the pigment lining the back of the iris and choroid and by the contracting power of the pupil. Hence the dark eyes of the Southern and Negroid races, who are subjected to sunlight containing excess of heat radiation.

Now, it must be conceded that in all human races the eye is self-adapted to endure, without harm, the daylight common to the part of the world from which any particular race springs: the point is sufficiently obvious and need not be laboured. And it therefore follows, as a necessary corollary, that ultra-violet radiation of wave-lengths between 400 $\mu\mu$ the end of the visible violet spectrum, and 350 $\mu\mu$ are also perfectly harmless. Consequently again, therefore, there is no need to protect healthy eyes from the ultra-violet radiation of ordinary daylight for which the eye is self-adapted under ordinary circumstances.

The same applies to the luminous rays of the visible spectrum and to the infra-red radiation. The eye is normally adapted to endure them without harm.

Practically, however, there are several possible subsidiary factors which complicate the situation and make it less straightforward than it appears at first sight. The most important of these factors are: (1) The intensity of the light; (2) the duration of the exposure; (3) the presence of glare; (4) occupation or trade.

(1) *Intensity of light.* The intensity of the light may react on the eye in one or both of two ways. Intense degrees of sunlight imply an atmosphere abnormally charged with ultra-violet and infra-red radiations, and this is well illustrated in the sunlight of mountains such as the Alps, where, on account of the rarefaction of the atmosphere and the comparative absence of vapour, the spectrum is extended at both ends. And again, extreme degrees of sunlight imply an actual increase of dosage, apart from the consideration of the wave-lengths of the penetrating light. If the light in a room is suddenly doubled, the respective wave-lengths of the spectrum are not altered, but only the total amount of light is changed. It is obvious that the effects of increasing the intensity of the light must be cumulative in the eye, but these cumulative results do not seem to react equally in every direction. They are almost certainly much more concerned with the luminous and infra-red portions of the spectrum than with the ultra-violet. As the light is increased, the luminous and heat rays are increased in proportion, and also our consciousness of them, because they all pass through the pupil unimpeded. The ultra-violet radiation must also be increased in quantity, but the eye is not so conscious of it, because of the natural protection afforded by the cornea and lens. Although by increasing the light there is a cumulative

effect with regard to those ultra-violet rays which can pass to the retina, any actual increase in the ultra-violet radiation is nullified to a very large extent by the construction of the eye. The natural protection from the luminous and infra-red radiations does not appear to be nearly so efficient; so that any danger arising

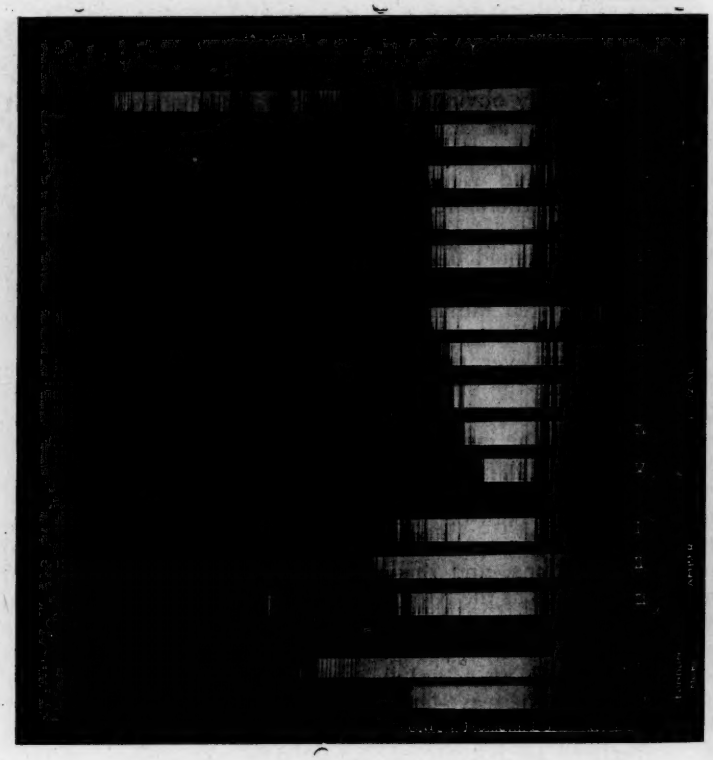


FIG. 1.

from submitting an eye to intense sunlight would seem to be chiefly with regard to the red end of the spectrum, and not with regard to the violet end.

(2) *The duration of the exposure to high light.* Here again the question of cumulative effect must very much modify our conception of the self-protectiveness of the eye. Under certain conditions of health, prolonged exposure to even moderate degrees of light may be harmful, because the natural resistance may be lowered. We see, of course, the same thing throughout the whole

range of disease in the sense that a general lowering in the power of function is a natural sequence when the nutrition is lowered, from whatever cause. Consequently when we begin to talk about what, if any, protection from light is needed in any particular instance, the question has not only to be considered from the

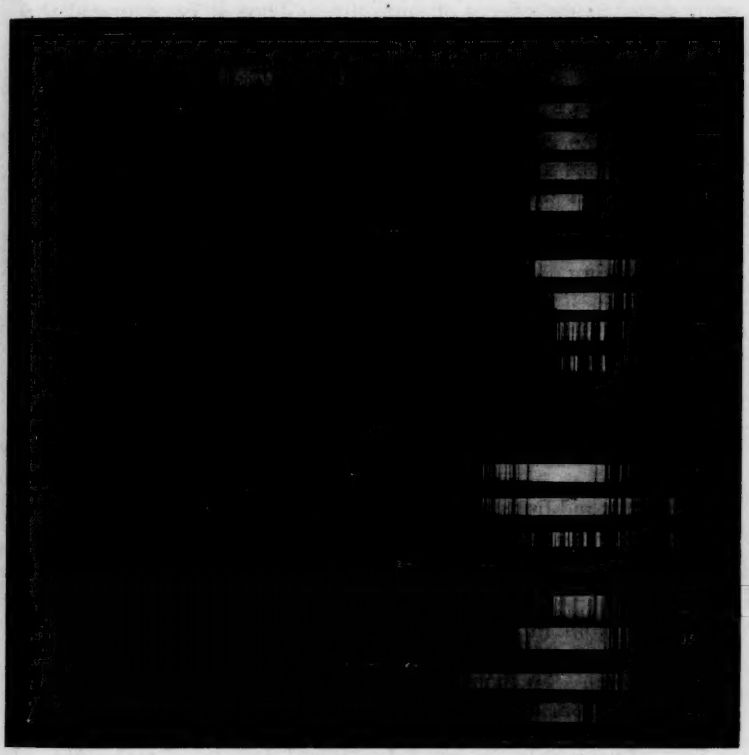


FIG. 2.

narrow point of the intensity of the light, but also from the broader standpoint of the length of time the eyes are to be exposed, and the individual's own capacity to endure the light without harm.

(3) *Glare.* The presence of glare may complicate the matter very considerably. Glare is an expression which denotes the unpleasant effect produced on the eyes by an excessive amount of reflection from below. It generally proceeds from snow, desert sand, rock, water or chalk; and it owes its disagreeable effects

to two causes. Firstly and chiefly, because we are accustomed to proceed with our eyes directed straight before us or slightly lowered, and the reflected light or glare strikes the eye in an unusual and unaccustomed manner, which distresses us on that account: and, secondly, because glare is something over and beyond what we normally experience, and which must be added, as it were, to the effects of sunlight. Thus it is estimated that snow reflects about 70 per cent. of the existing sunlight, and it is possible, therefore, in situations where there is much glare, to experience the effects of intense light even though the direct sunlight may be of quite a moderate intensity. For the reasons just stated, the effects of glare would seem to be exerted rather in the luminous and infra-red directions than the ultra-violet, and on this account one is led to the conclusion that snow-blindness is not nearly so much due to excess of the ultra-violet radiation as to excess of exposure to the luminous and infra-red radiations. The distressing conjunctivitis that accompanies snow-blindness is, according to this point of view, due to direct scorching of the conjunctiva similar to that which occurs in the retina in cases of eclipse blindness.

(4) *Occupation.* Some trades involve long and dangerous exposure to particularized forms of light. Thus, on the one hand, acetylene welding exposes the worker to an intense ultra-violet radiation, whilst glass-blowers and workers in foundries are subjected to much heat radiation. Trades of these kinds are abnormal conditions of life, which must receive special consideration over and beyond that accorded to those not so occupied.

Considerations as to the relative value of various Tints

In order to present the matter as accurately as possible I asked for help from Messrs. Hamblin, who most kindly took the greatest interest in the matter and arranged for the necessary examinations. To them and to Dr. Judd Lewis, who undertook the experiments, and whose name is a sufficient warranty for the accuracy of the work, I tender my most hearty thanks.

For the purpose in hand I selected London Smoke No. II and IV, Amber Nos. I, II, and III. Fieuzal Nos. I, II, III, IV and V. Crookes' A, A2, B and B2, and Peacock Blue. Dr. Judd Lewis was asked to produce spectrum photographs of each of these tints in two grades of thickness, one of 0.5 mm. and the other of 2 mm. thickness. These photographs are incorporated in Figs. 1 and 2. Comparison between these two series of photographs will at once emphasize the enormous difference the thickness of the glass makes to the spectroscopic value. In order to illustrate the matter more completely Dr. Judd Lewis undertook to demonstrate the spectrum photographs of the 2 mm.

tints in a series of absorption curves. The majority of these curves have been incorporated by Messrs. Hamblin in a chart (Plate) in which each tint is represented by a separate colour. For the sake of clearness some of the shades have been omitted, those included being sufficient to emphasize certain points which I wish to demonstrate to you this evening. I did not think that it was worth while to examine the spectrum photographs of the 0.5 mm. tints because the photographs were sufficient to bring out the point on which I desire to lay stress, that surgeons should realize how much the value of any prescribed tint is affected by the thickness of the glass supplied by the optician. To this point I shall refer yet once again a little later on.

If you look at the chart of absorption curves you will note that each tint starts steeply at zero at the violet end of the spectrum where visible light ceases and then trends away in various degrees of curvature to the red end where it passes away into the little known infra-red portion. At the extreme limit of the red end all the tints are still allowing a certain amount of light transmission with the exception of the Peacock Blue which absorbs all light of wave-length longer than 570 $\mu\mu$.

Looking at the violet end of the spectrum the deeper Fieuzal tints have the greatest absorption value, being slightly more powerful than Peacock Blue and considerably more so than Crookes' glass.

One is further struck by the fact that only in the case of Crookes' glass is there any sort of uniformity in the position of the zero point at the violet end. All the various shades of Crookes' glass have practically the same protective power with regard to the ultra-violet radiation, whereas all the other kinds of glass submitted for examination show an extraordinary variation in this respect, the ultra-violet protection seeming to depend very largely on the depth of the tint, being less marked in the lighter shade and becoming progressively deeper as the shade is deepened. This can, I think, be only explained by the composition of the glass employed. In Crookes' tints the glass is absolutely standardized and the tints, as it were, superimposed, whereas in all the other tints the various shades are the main factor, and their effect is influenced by being incorporated in a glass which is not standardized. In other words the ultra-violet protective value of Crookes' glass is not much affected by the density of the tint, whereas the value of all the other tints is very much so influenced.

It would seem, therefore, that although Crookes' glass is not the most powerful agent we possess for shutting off the blue end of the spectrum as well as the ultra-violet rays, it nevertheless has this most valuable property, viz., that we know exactly what we

are getting when we prescribe it, and if protection from ultra-violet radiation was the only point to be considered Crookes' A would be just as valuable as Crookes' B2.

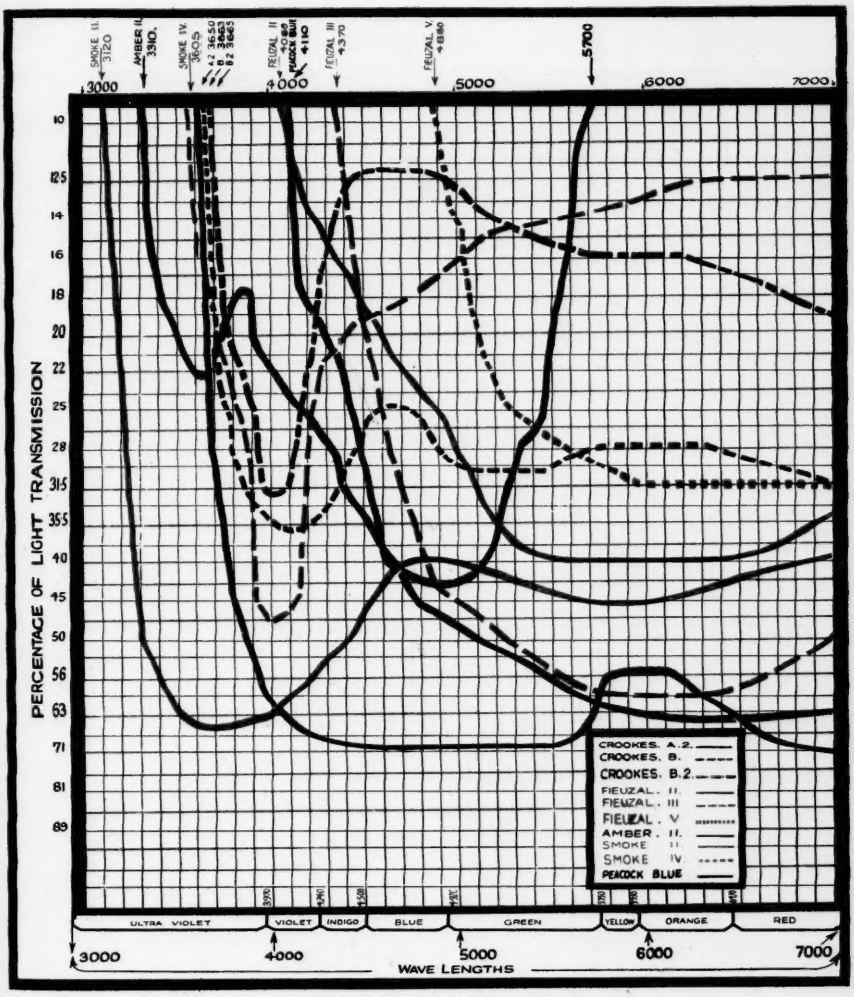
However, as I have already attempted to point out, protection from excess of ultra-violet radiation is only one factor in the situation. In the majority of cases when a tint is ordered it is chiefly from the point of view of general shade effect, whilst in others, protection from red and infra-red radiation is at least as important as protection from ultra-violet, and sometimes more so. If we look upon the tint simply as a means of obtaining shade, all the various types of glass in common use are approximately of the same value, the main factor to be borne in mind being the amount of shade desired, which is regulated by the density of the tint and by the thickness of the glass.

There is, moreover, a second subsidiary factor to be remembered, which is the effect of the tint on the patient's comfort. Some tints exercise a more depressing effect than others and some interfere more than others with the general colour scheme. Thus the shades of London Smoke and Crookes' B and B2 are less pleasant in these respects than Amber or Fieuzal tints; but if you refer to the absorption curves reproduced on the chart, you will see that to produce a given shade effect a somewhat deeper shade of Fieuzal and Amber is needed than if London Smoke or Crookes' glass is employed.

With regard to the particular protection from the red and infra-red radiation Peacock Blue is obviously far and away the best tint to employ. However, it cuts out such a tremendous lot of colour that the effect on the patient is extremely unpleasant and depressing and its uses are, therefore, very much restricted. There is not a great deal to choose between the other tints. The deeper shades of Crookes and London Smoke produce curves which are very similar and exclude rather more than the corresponding shades of Fieuzal. All the Amber spectrum photographs were so inefficient as regards all the points just considered, when compared with the other tints, that I have only reproduced one Amber curve on the chart. The example shown of a medium Amber shade curve sufficiently proves the inferiority of this tint to all the others in general use.

After these remarks on tints in general I will pass to a short analysis of the absorption curves shown on the chart. To prevent the confusion necessarily arising from a great many intersecting lines only a certain number, which were calculated to bring out the special points just mentioned, have been included.

The most intersting curve of all the tints is the Peacock Blue, which absolutely excludes all rays shorter than 400 $\mu\mu$ or longer than 570 $\mu\mu$, which means that all the ultra-violet and some of



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the violet rays are excluded at the one end and all the yellow, orange and red rays at the other. It thus affords an infinitely larger range of protection than any other tint.

All the tints compounded with Crookes' glass shut off the ultra-violet rays of a shorter wave-length than 350 $\mu\mu$, which means that they give good ultra-violet protection, but they are not nearly so efficient with regard to the blue and violet end of the visible spectrum as the corresponding shades of Fieuzal. The charts show quite conclusively the point, which I do not think has been generally noted before, that the deeper shades of Fieuzal Nos. 3, 4, and 5 effect the most powerful protection of all known tints with regard to the violet end of the spectrum, much more so even than Peacock Blue. It will be seen that Fieuzal 5 shuts off nearly all the blue and every ray of shorter wave-length than 490 $\mu\mu$.

London Smoke IV (dark medium) which is of a little lighter hue than Crookes' B2 produces an interesting curve. It affords very nearly as much protection from the ultra-violet radiation as does the Crookes' B2, but it allows a good deal more of violet and blue radiation than does the Crookes' B. On the other hand it shuts off a good deal more of the orange and red radiation than Crookes' B2.

With regard to the protection from red radiation, Crookes' B and B2 and London Smoke IV are better than any of the Fieuzal shades, but both are markedly inferior to Peacock Blue.

As an efficient shade from high lights without general reference to ultra-violet and infra-red radiation, London Smoke of medium tint in the form of Crookes' B is very satisfactory. Crookes' B2 and London Smoke IV exhibit very similar curves and are both excellent when deep shade is required, Crookes' B2 being preferable because of its superior protection from ultra-violet radiation. The Fieuzal tints are all rather disappointing in this respect.

Crookes' A2 is a remarkable glass in that it affords substantial protection from ultra-violet radiation without seriously impeding the luminous rays. It is in this respect infinitely superior to a light shade of London Smoke and much better than Amber. In this way is explained the refreshing qualities in conditions of mild glare such as exist in theatres and cinemas.

The most uniform curve is obtained from Crookes' B. This glass gives good protection throughout the whole length of the spectrum transmitting at one point no more than about 35 per cent. of the radiation. It is on these grounds the most satisfactory of all the tints examined and seems to be the best for general use.

Finally, two more points arise from the consideration of these tints. Both have been previously mentioned; but I should like

to draw a little more detailed attention to the desirability of obtaining a greater uniformity of shade and spectroscopic effect than that which obtains at the present time. It is quite obvious, I think, that nobody does or can know what is really provided when a tint is ordered, unless Crookes' glass is selected.

Take, for instance, the three shades of Fieuzal given. The three pieces of glasses from which the spectrum photographs and the illustrating curves were made were precisely similar in thickness and only apparently differed in shade. Yet you at once see that the composition of the glass must be very different because they give such extremely varying effects spectroscopically, and, most curious point of all, Fieuzal 3, which is a darker shade than Fieuzal 2, allows more transmission of the red, orange and yellow rays than does Fieuzal 2. This question of standardizing the glass is the first point, the second being the thickness of the glass employed to which I have already alluded. I do not suppose that any ophthalmic surgeon has ever interfered with what may be regarded as purely opticians' work, to the extent of suggesting the thickness of the glass to be used when ordering a tint; but yet it is often a matter of the greatest importance, and especially so, perhaps, when prescribing a tint to be overlaid on a minus lens.

As a result of this lack of standardization in the quality and thickness of the glass employed, the whole supply of tinted glass with the exception of Crookes' glass is in a most unsatisfactory state. Nobody can write a prescription for the supply of a tint and have the slightest idea of the true value of what will be supplied to his patient unless he has some private arrangement with a firm of opticians, and has a special box of tints of uniform thickness which correspond exactly with what the optician supplies. Even then, neither he nor the optician has any control over the manufacture of the glass and as I have pointed out both may be utterly deceived in consequence.

Perhaps these considerations are of the greatest importance when it is a question of supplying special protection in dangerous trades, or for those undertaking journeys or exploration in countries where they will be exposed for long continuous periods to great glare, as for example in the recent expeditions to explore Mount Everest. I hope that this question of standardizing different tints will now receive the consideration which is its due, and I think it is a question which might with great advantage be brought before the Council of British Ophthalmologists.

My personal belief is that if Crookes' glass were combined with Fieuzal shades as well as with London Smoke, we should then possess with Peacock Blue a series of highly standardized tints which would meet all and every requirement. It should

further be made clear that the glass, unless there is a special indication to the contrary, is always provided of a certain standard thickness, and that variations from this standard must be compensated for by ordering a lighter or darker shade, as the case may be.

The Wearing of Tints in Health and Disease

1. *The wearing of tints for healthy eyes.* As harmful ultra-violet radiation does not exist under ordinary circumstances of daylight, protection by special ultra-violet glasses is quite unnecessary. When extraordinary circumstances are apt to be encountered, the main factors to be considered are the luminous and the heat radiations, rather than the ultra-violet. As already explained, these circumstances are present when the eyes are exposed for prolonged periods to the effect of high sunlight and glare, especially when these factors are present in rarified atmospheres of the higher altitudes, such as the Alps on the one hand, or to the sun of the plains in the Tropics, on the other hand. Although the effect of the Fieuzal tints seems rather to diminish towards the red end of the spectrum, I believe that these would, if the glass were properly standardized, prove to be, on the whole, much the best shades to employ in high glares, with the exception of Peacock Blue, which is the most protective of all.

One often hears of Crookes' glass A or A2 being ordered for reading and work. Very often, I think, it is because the prescriber has the idea that artificial light is stronger in ultra-violet radiation than is sunlight, which is an entirely erroneous view. Dr. Leonard Hill, in his recent work on sunlight and fresh air, states that in the case of an oil lamp 97 per cent. of the energy is in the infra-red region, and of electrical incandescent lamps, 95 per cent.; so that if it is considered desirable to protect the eyes by some tint in artificial light, Crookes' glass possesses no special advantage from a medical point of view. Crookes' A or A2 glass has, however, this superiority, namely, that it affords a general shade without materially disfiguring the appearance or altering colour values, and, as a matter of practice, it is, on these accounts, very useful and often very much appreciated by sensitive patients.

Then we must consider a large class of cases consisting of patients who have perfectly healthy eyes but who are physically or mentally abnormal. In physical disease and in neurasthenia the general function of the eyes is very commonly impaired. Thus we note that the physical invalid prefers, as a rule, that the blinds should be, to some extent, drawn; and, similarly, mental invalids suffer to some extent from photophobia. Whilst, therefore, undue protection is to be deprecated in health, we are bound to give help in cases of lowered health, from whatever

cause, and whether for the purpose we prescribe yellow, smoked, or Crookes' glass, is immaterial. The choice of tint rather depends upon the effect that the tint has on the individual. Smoked glass is to-day as valuable as it ever was, but it has the disadvantage of being somewhat depressing in its general effect, and Fieuzal, which is as effective without interfering so much with the colour scheme, is often preferred. Crookes' glass is excellent too, especially that variety which combines a smoke tint, and is known as Crookes' B, or Crookes' B2. In any case, however, we should disapprove of too much protection in this way, and should not only advise the gradual discontinuance of the tint as the general health improves, but should, in nearly all cases strongly discountenance what has become a very common and pernicious habit, viz., that of wearing some sort of tint continuously, whatever the light and whatever the occupation.

We should always remember that the habitual wearing of shades is apt, like all other habits, to become fixed, and to produce not only a dislike of conditions of light which are perfectly harmless, but a positive inability to endure them unaided. When such a condition is reached, the person suffers a great deal of inconvenience, besides, of course, detracting very much from her or his personal appearance.

2. *The wearing of tints for diseased eyes, or as a prophylactic measure against disease.* It has been shown quite definitely, I think, that cataract due to glass-blowing and allied trades is due more to harmful infra-red radiation than to ultra-violet rays. Tints such as Fieuzal 4 or Fieuzal 5 or Peacock Blue afford the best prophylactic. In all cases of cataract, from whatever cause, tinted glasses to wear in bright sunlight or in glare should be ordered. I have no doubt in my own mind that there is nothing more harmful in the early stages of cataract than exposure to bright lights of any kind, and I am most careful to order efficient protection to all my patients with that condition. Glare by artificial light should be shunned as much as glare in daylight. I think, in this variety of cases, where a habitual tint is indicated, there is nothing more pleasant or comforting to the patient than Crookes' glass, though other tints are just as effective. I often make a point of ordering two degrees of shade, one for moderate, and one for extreme degrees of light. Reading glasses of Crookes' A are quite efficient, and have the advantage of not cutting off so much of the luminous rays as to interfere with the patient's comfort. After the extraction of cataract, the eye is deprived of its most powerful protector against undue ultra-violet radiation. Further, the high plus lens usually necessary to correct the refraction acts to some extent as a burning-glass. Consequently aphakic eyes need special protection, a point which, it seems to me,

is not insisted upon as much as should be the case. There are practical difficulties in the way in the case of hospital patients, who are usually supplied with large bi-convex lenses, on account of their extreme thickness, and also, to a slight extent, on account of the increased expense involved in making the glasses out of a tint. In the more modern and expensive "luxe" type of cataract lens the matter is easier. Crookes' A glass or the lightest shade of London Smoke or Fieuzal are the most suitable tints to employ, and personally I much prefer the Crookes' A, as being the less disfiguring and the most suitable for the purpose. I feel strongly that all aphakic patients should have some protection outdoors, except on dark and cloudy days, and if the lenses are made out of Crookes' A, the same glasses will do for indoors as well as outdoors, without materially interfering with the patient's comfort. Reading lenses may be similarly constructed, and should indeed be so made if the patient is wearing lenses made out of Crookes' A glass at all other times.

In active inflammatory disease of the retina and choroid, I much prefer, and always order, Peacock Blue. By it all ultra-violet and infra-red radiations are entirely shut off, and a very large proportion of the luminous rays as well. It has a peculiarly soothing effect on the patient, and forms a most valuable kind of treatment. There is, to my mind, no other tint comparable with it.

A NOTE ON THE LATERAL OCULAR MUSCLE BALANCE IN SCHOOL CHILDREN, WITH SPECIAL REFERENCE TO SQUINT IN MYOPIA*

BY

ERNEST THOMSON, M.D.

STIRLING

MUCH study has been given to heterophoria and a great deal has been written about it, yet it is doubtful whether statistics of tests of the muscle balance in any considerable number of children have been published. For that reason alone the present figures, although only covering some 500 cases, may be of interest. Yet statistics as such, and without a direct purpose, are not the primary interest of this article.

In the July, 1919, number of this journal the writer published

*This article was written several years ago. It is now published in order to supplement the writer's opening paper at the Oxford Congress, 1924, on the "Treatment of Convergent Concomitant Strabismus." It is much to be regretted that an error crept into the MS. of Table II, as sent to the printer (*Trans. Ophthal. Soc. of the U.K.*, 1924, p. 241) where the figures for the 4th group are wrongly given. The correct figures for the 24 Emmetropic cases are: Orthophoria, 1; exophoria, 5; esophoria, 18; the ratio exophoria to esophoria being 1 to 3.6.

an article entitled: "Some Statistics of Myopia in School Children," in which it was stated that in the 790 cases of myopia and myopic astigmatism then under analysis "convergent squint was not only not less frequent but was actually more frequent than divergent." It was also said, "I am free to admit that my records of exophoria are not trustworthy, and, therefore, they have not been stated."

Subsequent reflection indicated that it was advisable to endeavour to ascertain the condition of muscle balance in a series of non-squinting children coming up for "visual" treatment in the area of the country of Lanark Education Authority. Originally 1,000 was the number aimed at, but circumstances necessitated the reduction of this to 500. Actually 497 cases were recorded. Of the 497 cases eleven were rejected as not satisfactory. There remains a total of 486 upon which the statistics in the accompanying table are based.

It is difficult during the pressure of school refraction work to devote much time to scientific investigation, and so it was reluctantly decided that only the lateral balance could be tested, and that qualitatively only. The vertical component was not investigated.

The question may be asked whether the statements of children as to the position of the Maddox red line can be considered as reliable. The answer to that is that the writer found the average school child to be remarkably sharp and positive as to the right or left position of the line relative to the light, and more was not asked. Any child who hesitated was either omitted from the statistics altogether or was admitted only after a second trial. Had it not been for the rejection of the duller children the numbers recorded would have been considerably larger.

There were two circumstances of test. In the first group the child was attending for the first time and was tested for muscle balance after taking the visual acuity and before the instillation of atropin.* In the second group the child attended with the spectacles previously prescribed and the Maddox test was carried out with the spectacles on. The cases do not overlap; those in the first category are not the same children as those in the second. The statistics, therefore, refer actually to individuals. In every case the refraction was worked by retinoscopy under atropin. The condition of refraction, having been objectively ascertained can be fairly well vouched for; that of the

*In this connection I may be allowed to point out that the refraction was worked under atropin in all the cases dealt with in both of my articles and that the classification was made thereafter. In his Opening Paper at the Oxford Congress, 1924, when referring to my previous communication, Dr. Landolt said, "We need only recollect that myopia in children is most often due to spasm of accommodation." With this statement I, personally, am in complete disagreement, but it is possible that the author, speaking in a foreign language, did not intend the statement to be quite so definite.

muscle balance, subjectively ascertained, must be allowed a margin of error, but the error is probably not great as between qualitative exophoria and esophoria.

It may be well to state exactly what questions were asked of the child. The Maddox rod having been placed before one eye (the better eye if any difference of acuity) the child is asked: "Do you see a red line up and down?" "Yes." "Is the red line straight up and down?" "Yes." (If "No" then of course the rod is rotated till the line appears straight.) Then, touching the child first on the right and then on the left arm, "Tell me which side of the light the red line is on; put up the arm which shows which side." As a rule this is done so smartly as to leave no doubt, though, of course, a considerable number boggle over it and contradict themselves. Such children find no place in the statistics. Orthophoria was accepted when the child stated spontaneously that the line passed through the light. The leading question was not asked, "Is the line through the light?" except when an apparently intelligent individual seemed to hesitate in giving a reply to the "which side" question.

It is perhaps advisable to state that the source of light had to be larger than one would wish to employ. It was necessary to make sure that both images were unmistakably seen and that without too much delay.

The ages of the children examined (taking the whole number, 497) were as follow:

Years.	Cases.
6	8
7	14
8	30
9	129
10	74
11	65
12	121
13	47
14	6
15	0
16	1
17	2
Total	497

Passing now to the consideration of the actual figures and their bearing on the question of squint in myopia, one finds that, as always, "anisometropia" is the stumbling block in statistics dealing with binocular vision. In reports to eye hospitals,

education authorities, etc., one finds the reporter in the uncomfortable position of being expected to state the number of different refraction cases when, in reality, some patients represent two different types of refraction. A satisfactory definition of anisometropia is still to seek. Jackson believes that anisometropia will always have, in practical use, a somewhat indefinite significance, and that at best it is used to designate a condition with variable limits (*Am. Enc. of Ophthal.*). For example, one can hardly deny that if one eye presents myopia or myopic astigmatism and the other eye mixed astigmatism, there is anisometropia, yet the latter may differ from the former only to a slight degree.

The writer came to the conclusion that, for the purpose in view at any rate, the only method of dealing with this difficulty is to ascertain the numbers of exophorias, esophorias and orthophorias occurring in all the possible combinations of binocular refraction, and then to classify these combinations into groups. As will be seen on reference to the table this has been done, the groups numbering four, namely, the Hypermetropic Group, the Myopic Group, the Anisometropic Group, and the Emmetropic Group (both eyes emmetropic). This classification is far from perfect. For instance, where one eye is emmetropic, the other ametropic, the case has been considered binocularly as belonging to the group corresponding to the ametropic eye and not to the anisometropic group. Again mixed astigmatism has been regarded as belonging to the myopic group since the myopic element is usually the larger and because the tendency is towards myopic astigmatism in the long run.

It is possible that the table may be interesting (though the numbers are too small to be of much use from a general standpoint) from other aspects, but the purpose of this article is the single one of showing the relation of exophoria and esophoria respectively to myopic refraction and of comparing the result with the relation of divergent and convergent squint to myopic refraction.

Taking from the table, column 3, the myopic type as a complete group of 159 cases (69 without and 90 with correction) we find that exophoria is to esophoria approximately as 34 per cent. is to 62 per cent. (orthophoria making up the 100). If it be objected that in a myopic group one eye at least must be myopic we may leave out MX and MX, and MX and E. That leaves 117 cases in the myopic group, and, of these, exophoria is to esophoria approximately as 39 per cent. is to 56.5 per cent. (orthorphoria making up the 100).

Referring now to the article on myopia in school children previously mentioned, it will be found that out of 790 cases of myopia and myopic astigmatism in one or both eyes there were 29 divergent squints and 45 convergent squints, the percentages

being 3.67 to 5.69. Some of these squints were doubtful. If we omit these (namely 2 divergent and 7 convergent) there are left 27 divergent and 38 convergent squints, the percentage now becoming 3.41 to 4.81.

It is obvious that the ratios between exophoria and esophoria, as recorded in the present article, are similar to the ratios between divergent and convergent squints in myopia as tabulated in the previous article.

To make the demonstration, the ratios can be set out as follows:

In 159 cases of the so-called myopic type (see Table) with and without correction, exophoria is to esophoria as	1 to 1.83
Or, omitting from the above, binocular mixed astigmatism and emmetropia with mixed astigmatism, there are 117 cases with and without correction in which exophoria is to esophoria as	1 to 1.43
In 790 cases of myopia and myopic astigmatism in one or both eyes (*Brit. Jl. of Ophthal.*, July, 1919) divergent squint is to convergent squint as 29 to 45, that is	1 to 1.55
Or, omitting doubtfuls from the above, as 27 to 38, that is	1 to 1.40

While the writer anticipates criticism of his statistics on the grounds (1) that they are too small; (2) that no account was taken of deviations other than lateral; and (3) that children are not supposed to be satisfactory patients where subjective examination of this kind is concerned, he feels nevertheless that the correspondence between the two sets of figures, the one showing the ratio between exophoria and esophoria in the myopic type-group of non-squinting children and the other the ratio between actual divergent and convergent squints in myopic children, is close enough to show that not only was convergent squint more common than divergent in 790 myopic children previously examined, but that (although the group is smaller) in a group of myopic children belonging to the same area who did not squint, the tendency to convergence was greater than the tendency to divergence by approximately the same amount.

Although only a portion of the accompanying table has been utilized in the thesis here maintained it has been thought proper to publish the complete figures. These may possibly prove of interest. Two points seem to stand out. Firstly, the great preponderance of esophoria in children, in all types of refraction, though especially in the hypermetropic and anisometropic types. Secondly, there is no particular evidence that one group of children wearing correction differs materially as regards the quality

of the lateral balance from another group of children not wearing correction. The writer hopes to be able to ascertain whether in the *same children* tested with and without correction there is any manifest change in the muscle balance.

TABLE showing the number of cases belonging to each Type-group of Binocular Refraction (total 486) and the percentage Relation between Orthophoria, Exophoria and Esophoria.

	Without Correction 290.			With Correction 196			Total With and without Correction 486		
	Ortho	Exo	Eso	Ortho	Exo	Eso	Ortho	Exo	Eso
HYPERMETROPIC TYPE									
H and H ...	0	15	30	3	7	26	3	22	56
H ,, HA ...	1	4	28	1	2	11	2	6	39
HA ,, HA ...	1	12	78	1	4	39	2	16	117
H ,, E ...	0	2	0	0	0	0	0	2	0
HA ,, E ...	0	0	4	0	0	0	0	0	4
	2	33	140	5	13	76	7	46	216
Group Percentage ...	1.14	18.85	80.00	5.318	13.83	80.85	2.6	17.10	80.29
MYOPIC TYPE									
M and M ...	2	4	4	0	8	12	2	12	16
M ,, MA ...	0	1	3	0	4	3	0	5	6
M ,, MX ...	0	0	3	0	0	0	0	0	3
M ,, E ...	0	0	1	0	0	0	0	0	1
MA ,, MA ...	1	8	12	2	15	22	3	23	34
MA ,, MX ...	0	3	2	0	1	0	0	4	2
MA ,, E ...	0	2	1	0	0	3	0	2	4
MX ,, MX ...	1	2	18	0	6	12	1	8	30
MX ,, E ...	0	0	1	0	0	2	0	0	3
	4	20	45	2	34	54	6	54	99
Group Percentage ...	5.79	28.98	65.21	2.2	37.7	60	3.77	33.96	62.26
ANISOMETROPIC TYPE									
H and M ...	0	0	1	0	0	0	0	0	1
H ,, MA ...	0	0	2	0	0	0	0	0	2
H ,, MX ...	0	0	6	0	2	3	0	2	9
HA ,, M ...	0	0	0	0	0	0	0	0	0
HA ,, MA ...	0	0	1	0	0	1	0	0	2
HA ,, MX ...	1	2	9	0	0	6	1	2	15
	1	2	19	0	2	10	1	4	29
Group Percentage ...	4.54	9.09	86.36	0 00	16.66	83.33	2.94	11.76	85.29
EMMETROPIC TYPE...	1	5	18						
Group Percentage ...	4.16	20.83	75.00						

NOTES.—Emmetropic type = Both eyes emmetropic.
MX = Symbol used for mixed astigmatism.

ANNOTATIONS

Blindness due to a rare form of Encephalitis

Two articles in a recent number of *Brain* call attention to a very rare condition of the central nervous system in which occur symptoms of great interest to ophthalmic surgeons. The first article is by Dr. Bouman of Amsterdam, and the second by Drs. Collier and Greenfield, National Hospital, Queen Square. The disease with which they deal has evidently been known in a somewhat obscure way for some time, but was first defined and identified as a clinical entity by Schilder in the year 1912, who gave it the name of encephalitis periaxialis diffusa. It is allied, on the one hand, to disseminated sclerosis, and seemingly, on the other hand, to a diffuse gliomatosis. Unlike disseminated sclerosis, however, it seems to commence in one focus and not in a series of isolated foci. It spreads from its initial focus diffusely in the white matter of the centrum ovale. In the preponderance of cases, it seems to commence in the white matter of the occipital lobes, and spreads from there into the white matter of the temporal lobes, parietal lobes and frontal lobes, so that, ultimately, the whole white matter of the cerebral hemispheres may be affected. The myelin sheaths are the portions of the white matter primarily affected, and in this respect it resembles disseminated sclerosis.

The predominant feature of interest to ophthalmic surgeons is the early onset of blindness, evidently usually commencing as a hemianopia, sometimes quadrantic, sometimes altitudinal, but gradually or rapidly becoming complete, and without any ophthalmoscopic changes in the majority of cases. In only a few cases of rapid onset slight degrees of papilloedema have been observed. In one or two cases, slight ocular-motor palsies have been noted, but these have not been a common symptom. The most characteristic symptoms, apart from the blindness, are the fairly rapid development of spastic paralyses (diplegias and quadriplegias) and progressive amentia. The disease usually occurs in childhood or early adult life and is progressive to a fatal termination within two or three years, the final stages being marked by complete spasticity and amentia.

Cause of Myopia

The discussion on the causes of myopia still proceeds and seems likely to continue for long enough. In a letter to the editor of the *Lancet* of October 25, 1924, Edridge-Green repeats the statements made in his Arris and Gale lecture of 1921 that myopia

is produced by dilatation of the eye through increased intraocular tension caused by back pressure through the veins of the eye. He states that if the patient is instructed to avoid such muscular effort as will cause this the myopia may remain stationary or even diminish and the eyes may in some cases become emmetropic. We do not consider that Edridge-Green has brought forward facts to justify the following statement: "The eye evidently possesses a power of contracting under diminished intraocular tension." The use of the word "evidently" implies that it is obvious to all, which it certainly is not. This is quite clear from, *e.g.*, the opening sentence of J. A. Wilson's reply in the *Lancet* of November 1. "I venture to state that few, if any, ophthalmic surgeons accept Dr. Edridge-Green's theory of the production of myopia." In the following paragraphs Wilson points out that sixty per cent. of myopic scholars are girls and that myopia is and has for long been known to be commoner among girls than boys, even before gymnastics were introduced into schools. He seems to hint at the finding of a mare's nest by Edridge-Green when he remarks that "artificial myopia due to spasm of accommodation does diminish." Wilson considers that the size of the eyeball is determined by the factor of heredity, though there are exceptions such as myopia due to keratitis. In this last case Wilson suggests that toxins pass through the cornea and filter back along the coats of the eyeball causing softening, and later, stretching at the corneo-scleral junction or at the posterior segment of the eyeball. J. L. Dick follows up the correspondence in the *Lancet* for November 29. He considers that myopia is essentially associated with debilitated states of the individual and is a disease of modern civilization. It is associated with debility rather than with continuous and excessive muscular action. Dick states that the thin sclera of the young child tends to be softened as the result of debilitating disease such as measles, rickets and whooping cough. "Diminished resistance of supporting structures rather than increased strain is, I believe, the essential factor in the production of myopia."

Dick, however, entirely omits to mention the heredity factor, and we do not think that any theory of myopia can possibly hold water that does not take account of this.

The correspondence is wound up in the *Lancet* of December 6 by Edridge-Green who admits the conditions mentioned by Dick as "contributory factors," and re-asserts his view that increased intraocular tension is the direct exciting cause. He repeats the "bull" case mentioned in the Arris and Gale Lecture which we transcribe from the text of the lecture itself: "A man staying at a farm had to help to hold a bull which had become wild, and he had to exert his strength to the utmost; he ruptured himself, became myopic to a low degree and blind in one eye through

detachment of the retina in the one afternoon; he stated that he had previously very good sight. Though such a disastrous result is fortunately very rare, this case admirably illustrates the causation of myopia, and had the increase been very slight might easily have passed unnoticed." Now the strength of a chain is that of its weakest link, and the weak link here is that the previous ocular condition of the patient depends solely on the patient's own statement.

Lastly, there is an annotation in the *Lancet* for January 3, 1925, which we take the liberty of summarizing in which the editor, referring to the recent correspondence in the columns of his journal, draws attention to the lecture by Sir Arthur Keith recently delivered to the British Optical Association. In this Sir Arthur compared the scleral structure of a baby's eye to that of the outer cover of a pneumatic tyre; the strands of fibrous tissue are so arranged as to stand a much greater strain than they are expected to receive from the intraocular pressure. But the eye must grow. It grows by the action of fibroblasts which can bring about the required processes of growth and can control the whole process by which the eyeball is shaped so as to withstand the internal pressure to which the eyeball is subjected. We do not know how the fibroblasts do their work, but after youth has passed their activity ceases. Sir Arthur suggested that just as in acromegaly the activity of the fibroblasts is entirely thrown out of gear by some defect in the secretion of the pituitary body, so some comparable fault in the mechanism which normally regulates the growth of the sclerotic coat of the eye must be at the root of myopia. Excessive convergence, vascular engorgement, unusual muscular effort are none of them adequate to originate myopia, though when once started all these may be adverse factors favouring its increase, a fact which justifies the advice usually given to myopes by the ophthalmic surgeon. What exactly causes the defective action of the fibroblasts is a problem as yet unsolved. The editor concludes: "Sir Arthur Keith has pointed out the direction in which we must look in order to solve it."

ABSTRACTS

I.—OPHTHALMOLOGY AND GENERAL MEDICINE

(1) **Dunn, John (Virginia).—Ocular inflammations the result of distant focal infection.** *Amer. Jl. of Ophthal.*, June, 1923.

(1) **Dunn** gives particulars of a series of ten cases in which there was complete subsidence of ocular inflammation following the removal of a focal infection. He states that all forms of iritis, except the traumatic, are of infectious origin; and that with the exception of the tuberculous and venereal types the infection will be found in the vast majority of cases in the mucous membrane of the upper air tract. This includes the sinuses, aural and dental regions. In his first case a severe acute iritis cleared up 48 hours after removal of small but infected tonsils. In his second, acute iritis developed in a congenital syphilitic aged 47 years, and cleared up 48 hours after removal of a tooth with apical abscess. In his third, severe irido-cyclitis developed in a woman aged 23 years with a marked secondary syphilitic eruption. Salvarsan and mercury had no effect but recovery began 48 hours after removal of large infected tonsils. In his fourth, a man aged 36 years, the right eye was blind from old uveitis and the same disease occurred in the left. Extraction of all the teeth, and double tonsillectomy had no effect but within two months of removal of the blind eye, the left eye was normal with vision of 6/6. In his fifth, a similar case, some improvement was manifest after removal of the tonsils, but a recrudescence occurred, and the condition was not finally cured until removal of the old blind eye. The sixth case sustained a bad corneal abrasion from a piece of pine bark. Local treatment for a month was of no avail; an old aching tooth was then removed and the abrasion healed at once. In the seventh, a subacute conjunctivitis in the outer part of the lid failed to yield to ordinary measures but disappeared promptly on removal of infected tonsils. The eighth was a case of chronic bilateral conjunctivitis lasting for fifteen years, with "fleshy ectropion" and displacement of the canaliculi. Local treatment was unavailing but removal of diseased tonsils brought about a complete cure.

The ninth was a woman, aged 50 years, with high blood pressure. The right fundus showed changes like those in renal retinitis, the left fundus could not be seen owing to the haze in the vitreous. Vision improved 24 hours after removal of badly infected tonsils, and within a month she could read the newspaper with her left eye.

In the tenth case, intense clouding of the vitreous cleared up rapidly after removal of infected tonsils.

F. A. WILLIAMSON-NOBLE.

(2) **Dunn, Percy (London).—The toxaemic aspect of ocular Disease.** *Lancet*, April 7, 1923.

(2) **Dunn's** theme is that obscure ocular diseases such as chronic irido-cyclitis "known under the name of K.P.," sympathetic ophthalmitis, and interstitial keratitis in children, even when the children are known to be syphilitic, are due to toxaemia and hypothyroidism. One gathers that Dunn considers the main source of toxaemia to be intestinal. "The toxaemia is subject to control by thyroid therapy, more or less. But in the case of the toxaemia arising from intestinal stasis the most scientific method of treatment must obviously be the sterilization of the putrefactive organisms in the intestine." The new benzene derivative dimethylomethoxyphenol is referred to in this connection. The author suggests that a normally saprophytic organism, the colon bacillus, may, in the presence of intestinal stasis, become pathogenic. Dealing with sympathetic ophthalmitis he says, "the inference is reasonable that were an organism such as we have supposed in an injured eye to become pathogenic owing to this toxaemia, its special toxin might be productive of the acute irido-plastic cyclitis in the wounded organ, to be followed subsequently, in the absence of due prophylactic measures, by the involvement of the sound one." Again, interstitial keratitis in children is secondary to an acute cyclitis. Dunn regards it as mainly a toxaemic manifestation and considers that this is supported by the results of his treatment of such cases, namely, rest in bed; generous feeding; "three grains of thyroid gland" twice daily, with atropin and fomentations.

It may be remarked that while Dunn's article is interesting and suggestive it does not appear to contain anything in the shape of proof of his views. Regarding chronic irido-cyclitis, he refers to the "favourable influence upon the course of the disease which thyroid treatment ensures," but does not give any details of any case of this most intractable disease which he has treated with thyroid. So also with regard to the theory of toxaemia in sympathetic disease, the theory is unsupported by even one case. No doubt such absence of cases treated is intentional, since the article appears in a journal mainly for the general practitioner, but the reviewer would suggest fuller publication in a specialist journal.

ERNEST THOMSON.

(3) **Thomas, Jerome B. and Cooper, Ward (Palo Alto, California).—Trichinosis with predominant symptoms referable to eyes and frontal sinuses.** *Amer. Jl. of Ophthal.*, July, 1924.

(3) **Thomas** and **Cooper's** case was a male aged 35 years, complaining of frontal headache and oedema of the eyelids, with a history of feverish attacks and sore joints and muscles during the preceding three weeks. There was oedema of the lids of both eyes with chemosis of the conjunctiva. Vision and fundi were normal. The headache became worse, and the oedema of the lids of both eyes increased to such an extent that it was difficult to separate them, and they were tender to touch. Temperature was 103° F. An X-Ray photograph of the sinuses showed appearances suggesting acute catarrh, with distinct opacity of the right sphenoidal sinus. The latter was irrigated with decided relief to the patient—it was noted, however, that this improvement occurred soon after a free bowel movement induced by a large dose of salts, also there was no pus in the sphenoidal washings. A blood count showed 30 per cent. eosinophiles, and a history was then elicited of the patient having eaten corned pork a month previously. Treatment was given for trichinosis, and in a little over a month he was able to walk about, though still complaining of pain in the leg muscles and sweats every three or four nights. A piece of excised gastrocnemius showed numerous encysted trichinae.

A short summary is given of the literature and the following points may be noted: The three cardinal signs of trichinosis are oedema of the lids, eosinophilia and muscular pain and swelling. Four out of six cases sought advice on account of eye symptoms. One case has been reported with optic neuritis and numerous retinal haemorrhages in both eyes. The incubation period is two weeks; trichinae have not been found in the stools. The differential diagnosis is from paranasal sinusitis, orbital abscess, lacrymal adenitis, rheumatism, influenza, typhoid and malaria.

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F. A. WILLIAMSON-NOBLE.

(4) **Franklin, W. S. and Cordes, F. C.—Lupus vulgaris with ocular extension.** *Amer. Jl. of Ophthal.*, July, 1923.

(4) **Franklin** and **Cordes** describe a case of lupus occurring first of all at the age of 13 years in a girl; at this time the condition was confined to the skin of the face and the eye was not involved.

The condition improved considerably under treatment and the girl was discharged and told to return for further treatment in a few months; she did not return until after a lapse of nine years; the eye was now blind, the lids extensively adherent to the globe, the cornea flattened and quite opaque and no details of the interior of the eye could be made out; on account of the girl's unhappy state the eye was excised.

The microscopical examination showed the corneal epithelium growing downwards into the parenchyma of the cornea and resembling the true dermis; there was a round-celled infiltration of the whole of the cornea which was perforated near the middle where an anterior synechia was present; an episcleral nodule was found containing epithelioid cells and a well-formed giant cell. The authors comment on the rarity in America of lupus vulgaris invading the ocular tissues, and state that this disease is much more frequently met with in Europe; they are of opinion that had the girl returned when she was told to do so, further treatment might have prevented the marked destructive changes from developing to so high a degree. A short bibliography is appended.

R.R.J.

(5) **Beach, S. Judd (Portland, Maine.)—Oedema of the eyelids.** *Jl. Amer. Med. Assoc.*, July 5, 1924.

(5) **Judd Beach** reports two cases in which oedema of the lids was a conspicuous sign. The first was a woman, aged 22 years, who complained of swelling of the lids and face of a few days' duration. There was symmetrical swelling of the lower lids and cheeks, the parotids being unaffected, and tenderness absent. Temperature was 99° F. and pulse 92. The urine was normal, the nose and sinuses were clear, and Widal's test negative. General examination a few days later revealed an enlarged spleen. A second Widal was done on the tenth day, which though negative to typhoid was positive to paratyphoid. There were no rose spots, and the disease cleared by lysis in a month. An identical attack of fever ushered in by swelling of the face had occurred just previously in the same household. The second case was a girl, aged 13 years, presenting a somewhat similar appearance. There was no chemosis, and Wassermann test was negative and urine normal. Recurrent attacks had extended over a period of seven to eight years. One particular attack followed exposure to cold wind, the temperature rose to 104° F., and there was enormous oedema of the right eyelids, the left side of the nose being blocked by swelling of the middle turbinate. A culture gave staphylococcus aureus. After a long discussion of this and similar cases the author concludes that the oedema was due to "an abnormal weakness of the defence mechanism against some one of the

common skin cocci, so profound that the tissues are unable to rid themselves of the infection."

F. A. WILLIAMSON-NOBLE.

(6) **McMillan, Lewis (Glasgow).—The association of failure of accommodation with sore throat.**—*Lancet*, May 27, 1922.

(6) **McMillan** has seen two cases of paralysis of accommodation following sore throat which he does not consider to have been diphtheritic. In one case the paralysis followed a severe attack of tonsillitis. No swab had been taken, but the doctor in attendance was positive as to the condition being tonsillitis and not diphtheria. In the other case there had been a severe sore throat and a swab was declared negative for diphtheria by the sanitary authority. Both cases recovered. McMillan does not dogmatize but brings the cases forward in order to elicit attention to the possibility of non-diphtheritic sore throat leading to paralysis of accommodation.

ERNEST THOMSON.

(7) **Blatt, Nicolas (Roumania).—The abduction phenomenon. (Zur frage des "abduktionsphänomens.")** *Klin. Monatsbl. f. Augenheilk*, Vol. 69, 1922.

(7) Under the inaccurate term of "Abduction Phenomenon" Behr describes a contraction of the pupil when the subject gazes sideways. He had occasion to observe this phenomenon in several pathological cases. Other authors, Graefe, Adamük, Weiss, etc., have also noted this curious reaction. **Blatt** first describes two cases where the phenomenon was to be observed, one a case of disseminated sclerosis, the other of syphilis. He thereupon studied the question in healthy individuals, 2,000 in number, whose ages varied between seven and forty years, and who were all examined by daylight. Behr's reaction was noted in four cases. Once it was present on both sides, three times on one side alone. The other reactions were absolutely normal in all cases examined.

V. ST. JOHN.

(8) **Girou.—Estimation of diphtheritic intoxication by the oculo-cardiac reflex. (L'imprégnation diphtérique dosée par le rèflexe oculo-cardiaque.)** *Rev. de laryngologie, d'otologie, et de rhinologie*, June 30, 1924.

(8) **Girou** reports upon his examination of the oculo-cardiac reflex in thirty cases of diphtheria. In nineteen cases he found that the reflex was of the reverse type, that is to say, pressure upon the eyes increased the pulse rate instead of diminishing it; in seven cases the reflex was abolished, and in four cases it was normal. He concluded that the reflex is normal when the attack of diphtheria is slight, that it becomes reversed in type as the

disease advances, and is finally abolished as the attack becomes very severe, the disappearance of the reflex constituting a veritable *cri d'alarme*. The value of studying this reflex in cases of diphtheria is two-fold; it assists one to arrive at a correct prognosis, and enables one better to regulate the amount of anti-diphtheritic serum to be administered.

J. N. TENNENT.

(9) **Brelet.—Inequality of the pupils and the oculo-cardiac reflex in pulmonary tuberculosis. (L'inégalité pupillaire et le reflexe oculo-cardiaque dans la tuberculose pulmonaire.)** *Gaz. des Hôpitaux*, August 19, 1924.

(9) **Brelet** draws attention to a recent article by M. W. Jullien on the inequality of the pupils in pulmonary tuberculosis. In an examination of 61 cases of unilateral pulmonary tuberculosis Jullien found the pupils unequal in 26 per cent. of cases. The inequality of the pupils is usually due to the sympathetic nerve becoming involved in apical pleurisy: less commonly it is due to a lesion not at the apex but at the base; in these cases probably the irritation is transmitted from the pulmonary nerve plexus to the trunk of the sympathetic. Inequality of the pupils is not peculiar, however, to tuberculosis; it may be caused by bronchial dilatation, hydatid cyst, tumour, etc., and further, every case of apical tuberculosis does not involve the sympathetic nerve.

According to Brelet information of more value in tuberculous cases can be obtained from a study of the oculo-cardiac reflex. In normal subjects pressure upon the eyes produces a slowing of the heart rate of from four to ten beats per minute. After studying this reflex in 45 tuberculous subjects, Perrin and Yovanovitch found it normal in ten cases, exaggerated in 22 cases, abolished in ten cases and reversed in three cases. These workers concluded that the reflex is normal when the disease is not far advanced, that it becomes exaggerated as the disease increases its hold, and that it is abolished in chronic cases, probably because of the prolonged action of the toxin upon the vagus centres. A study of this reflex would thus seem to be of some prognostic value in cases of pulmonary tuberculosis.

J. N. TENNENT.

(10) **Caiado, B. R. (São Paulo).—Contribution to the study of pulsating exophthalmos and its surgical treatment in Brazil. (Contribuicâo ao estudo do Exophthalmo Pulsatill, e seu Tratamento Cirurgico no Brasil.)** São Paulo, 1924.

(10) This is **Caiado's** thesis for the degree of Doctor of Medicine and Surgery of his Faculty. It forms a well-printed pamphlet of 85 pages and is illustrated with ten plates.

The first 31 pages deal with the anatomy of the cavernous sinus, the pathology, symptomatology, diagnosis and treatment of the condition; by far the larger part of the thesis is devoted to the account of the seven cases upon which the work has been based. Of the cases all but one were traumatic in origin, the second case was idiopathic. All were treated surgically, ligature of the common carotid on the affected side being performed; in one of the cases both carotids were tied with good result. The results certainly were very good. In one case the lids had to be stitched together on account of corneal ulceration, and this man was left with a very defective eye on the affected side. In the idiopathic case one of the eyes had been removed on account of pain before the patient came under the author's observation. Very little attempt is made at a bibliography, but the classical cases of Benjamin Travers in 1809 and of Nelaton in 1855 find mention.

R.R.J.

II.—DEVELOPMENT

(1) **Versari, Prof. Richard.—The facts of the development and the regression of the "tunica vasculosa lentis" and the morphology of the blood vessels in the ciliary processes and in the iris of the human eye. (Le fasi di sviluppo e di regresso della "tunica vasculosa lentis" e la morfogenesi dei vasi sanguiferi nei processi ciliari e nell'iride dell'occhio dell'uomo.)** *Ricerche di Morfologia*, Vol. III, Fasc. 2 and 3.

(1) This monograph on the development of the ***tunica vasculosa lentis***, and the vessels of the ciliary processes and iris of the human eye, is easily the most detailed and exhaustive work that has yet appeared on the subject. This one would expect, since **Professor Versari** has so often elucidated, by means of his beautiful injection methods, problems connected with this subject, such as the origin of the retinal arteries and the absence of a ***membrana vasculosa retinae*** in man.

The work is divided into four parts, with a full summary at the end, and contains some excellent coloured plates. Part 1 deals with the middle and posterior portions of the ***tunica vasculosa lentis***, Part 2 with the pupillary membrane, Part 3 with the ciliary processes, and Part 4 with the iris. A good bibliography is given, and there is exhaustive discussion and criticism of the work of other observers.

The main controversies have centred round the origin of the hyaloid artery, and the path of the blood flowing in it. Versari showed as early as 1900 that the hyaloid artery was a branch of

the *arteria ophthalmica interna*, or of the nasal long ciliary branch of this, and not, as was sometimes thought, of the annular vessel at the margin of the cup. This annular vessel, named by Fuchs "annular artery," but held by Versari to be venous in nature, since it receives blood carried from the *arteria ophthalmica interna*, via the hyaloid artery, is still the subject of controversy. Versari considers it to be formed of the most anterior loops of the general choroidal plexus which covers the whole outer surface of the optic cup in embryos of 10mm., and to be venous in origin. He describes the hyaloid artery entering the eye through the posterior end of the choroidal fissure and breaking up into three sets of branches. These are: 1, the vasa hyaloidea propria; 2, another set to the vitreous body; and 3, a central trunk dividing into three at the back of the lens and forming the *capsula vasculosa posterior*. The drainage of the blood so brought to the eye is into the choroid via the annular vessel, by means of capillaries passing in the first place through the anterior end of the choroidal fissure, and later leaving the eye between the equator of the lens and the margin of the optic cup. These marginal vessels form a complete ring round the lens; they are arranged in a palisade-like manner, and constitute the middle or capsulo-pupillary portion of the tunica vasculosa lentis. This arrangement is well seen in the 10-16mm. stages. Atrophy of the vasa hyaloidea propria begins at 63mm. As the lens grows the vessels of the posterior vascular capsule, which at first are very convoluted and form an irregular plexus with lacunae, straighten out, get thinner, and finally atrophy completely.

The anterior portion of the tunica vasculosa lentis (pupillary membrane) first appears, according to Versari, at 20-24mm. The blood is brought to the membrane by the long ciliary arteries. These bifurcate, the fork being wider on the temporal side, and then give branches to the pupillary membrane. Most of these form loops towards the centre of the pupil; some of them run right across. The blood is drained from them into the annular vein, and so into the choroid. At about 6 cm. the annular vein begins to disappear, and becomes indistinguishable from the rest of the choroid, while a new annular vessel, an artery, develops slightly behind it by anastomosis of branches connecting the bifurcations of the long ciliary and anterior ciliary arteries. This new vessel is the future major circle of the iris. Opinion differs with regard to the disappearance of the first annular vessel, Fuchs, Seefelder and Speciale-Cirincione maintaining that it communicates with the long ciliaries and is itself the anastomotic channel which becomes the major circle.

The ciliary processes begin as single veins which appear slightly raised above the level of the rest of the choroid. These vessels come from the first and second arcades of the network and empty

behind into a choroidal vein. They become more raised and communicate by lateral branches with the choroid, so that each resembles a little comb. There are anastomotic channels connecting the heads of the processes. Up to the end of the fifth month the processes are entirely venous; then small branches from the major circle grow into them.

The vessels of the developing iris can be divided at the seventh month into four sets: (1) Superficial, large vessels going to the pupillary membrane; (2) veins and arteries of the middle stratum of the stroma; (3) the intersphincteric plexus, and (4) plexus between the pigment epithelium and the sphincter. Versari confirms the observations of Brücke, Faber and Leber, that arteries appear to run directly into veins without the intervention of capillaries. He also emphasizes the fact, noted by Kruckmann and Leber, that the small circle of the iris is in reality a plexus composed of veins as well as arteries, and suggests that it be renamed the "small *vascular* circle." It is a pity that Versari did not give more particulars of the forward growth of the iris as a whole, since many points, *e.g.*, the secondary growth of the ectodermal iris and the separation of the pupillary membrane from its tip, the presence of the ridge in the position of the small circle, and the formation of the sub-sphincteric plexus, can only be understood by considering the development of mesodermal and ectodermal portions together.

IDA C. MANN.

(2) **Trantas (Constantinople).—Congenital anomalies. Persistence of the hyaloid canal. (Anomalies congénitales. Persistance du canal hyaloïdien.)** *La Clin. Ophtal.*, March, 1922.

(2) In the course of a detailed account of two cases of persistence of the hyaloid canal, **Trantas**, of Constantinople, mentions a method of examination of the ocular media which he has practised and described, though he does not say where, a method which is probably not well known. It consists simply in rendering the disc anaemic during ophthalmoscopic examination, by digital pressure upon the eyeball. On the assumption that the method is not in general use it seems advisable to acquaint readers with it by quoting the author's words. "When the globe is compressed by digital pressure so as to make the disc anaemic, the details of lesions of the vitreous appear sharper if one looks in the direction of the disc. There are many cases where, without this pressure, very fine opacities of the vitreous or lens remain unseen. There are cases of specific chorio-retinitis which, without this method, may be mistaken for neuro-retinitis, or in which one may remain in doubt whether there really is a lesion or not." The truth of this observation will be apparent to all readers. "This

method of exploration, it may be said, has served me in several other circumstances, for instance, in dimness of the vitreous in myopia due to microscopic dots, when the opacities occur as the smallest possible stationary points without vitreous softening. Again, and more especially, when there are minute stationary lesions in the immediate post-lental part of the vitreous, one is unable to make a differential diagnosis between lenticular opacities, vitreous opacities, or both. Digital pressure towards the equator of the globe while the opacities are explored with the ophthalmoscope settles the question, for, if the lesions are of the vitreous, the opacities recede under the pressure; lenticular opacities remaining fixed. This differential diagnosis is of great practical interest since the prognosis is quite different in the two conditions."

Most readers will probably agree that the hint here conveyed, in quite a casual fashion in the course of an article, is worthy of being picked out from its surroundings and the method applied to the very many cases in which it may solve a difficulty in diagnosis.

ERNEST THOMSON.

III.—MALIGNANT DISEASE

(1) **Delord (Nimes).—On a case of sarcomatous metastasis of the meninges with bilateral exophthalmos and thrombosis of the sinus.** *Annal. d'Ocul.*, Vol. CLX., January, 1923.

(1) Delord's case is one of considerable clinical and pathological interest. On January 12, 1922, a small boy of three and a half years was admitted to hospital for a swelling of the right temporal region and inability to swallow solids. The history showed that three months before he had had for fifteen days some degree of photophobia without any apparent cause, then two months later the mother noticed that the child took up the peculiar attitude of going about with the head inclined to the right side; no fever; no vomiting, but soon persistent headaches started. About December 18, some swelling of the right temporal region was noted, then the right eye became prominent and continued to be so more and more, and the mouth began to be kept more and more open; there was no ear or nose discharge. On examination, there was conspicuous forward proptosis of right eye with chemosis below and much diminished movements, corneal ulcer below from exposure; corneal sensation was normal with some pain on pressing eyeball back; pupillary reflex rather sluggish, vision much reduced; left eye normal. In the right temporal area there was localized oedema with pseudo-fluctuation deep-in. The child was quite conscious and keen. There was considerable oedema of hard and soft palates, and the temperature

was 38° C. No mastoid tenderness was present, and radiography of the head and face showed no diseased bone. Urine had no albumen nor sugar and the Bordet-Wassermann reaction was negative in the blood, as well as in the cerebro-spinal fluid, which was under high pressure and contained less than 0.22 of albumen, 0.45 of glucose, and cells 1.5 per c.mm. Nervous system examination showed no palsy, no anaesthesia, no hyperaesthesia; knee-jerks present. Before long the right eye became more proptosed and fixed, with total ulceration of cornea and defect of sensation. On January 18, left eye began to become proptosed, no oedema of papilla, and later corneal ulceration developed. Left temporal region became swollen and oedematous, with general face swelling, and for eight days the upper limbs and trunk retained for long any abnormal attitude they were placed in. Soft oedema of palate was very conspicuous showing two lateral swellings with a median furrow. Head was somewhat enlarged; three or four glands, size of a large cherry, were present in each submaxillary area. The child gradually sank and died on January 27.

Discussing the diagnosis Delord could not get away from one of cavernous sinus thrombosis, first right then left. Autopsy, however, showed the longitudinal sinus engorged, with thrombosis behind, lateral sinuses dilated but not thrombosed, no thrombosis in either cavernous sinus or in the ophthalmic veins, but at the base of the skull almost symmetrical nodules of the dura mater were found in front of the cavernous sinuses, the left one being adherent to brain. A hard tumour of the mesentery was found, whose cut surface showed small spaces with blackish contents, while the kidneys were thrice their normal size from tumour formation of a similar appearance. Sections of the mesenteric tumour showed fibrous bands dividing the mass into irregular areas of a homogeneous granular substance like lymphoid tissue but with necrotic and other areas with haematogenous pigmentation. Under the high power the lymphocyte-like elements forming the bulk of the tumour only faintly recalled the lymphocytes of the normal follicular organ; their nuclei were larger, more clear, at times irregular, and the disposition of their chromatic elements was in a number of them frankly atypical. Sections of the dura mater and kidney tumours showed exactly the same appearances as the mesenteric and it is concluded that the case was one of a malignant tumour of a lymphoid nature (atypical lymphocytoma).

It is well known that it is almost impossible to differentiate between true tumour formation and the enlargements seen in the leucocythaemias, as Beattie and Dickson state, and this is all the more reason for regretting that in the present case no notes are given of blood, spleen, bone-marrow, and eyeball.

W. C. SOUTER.

(2) **Koby, F. E. (Bâsle).—Epibulbar flat sarcoma with giant cells cured by radium. (Sarcome plan épibulbaire à cellules géantes guéri par le radium.)** *La Clin. Ophtal.*, November, 1923.

(2) **Koby** relates the case of an infant first seen at the age of sixteen months, who presented a neoplasm which extended from the limbus towards the *cul-de-sac* on the temporal side. It was elevated at the most 3 or 4 millimetres, was yellowish-red and but little vascularized, and had the consistence of a lipoma. A portion was excised and was found to be a sarcoma with polymorphs and giant cells of Langerhans. The whole neoplasm was as far as possible excised, and the diagnosis was confirmed. The child was brought back in a few months with an extensive thickened cicatrix, examination of a portion of which revealed that the neoplasm had not been cured. Owing to the superficial extent of the neoplasm operation did not seem to offer a satisfactory prospect. X-rays were tried but had to be abandoned on account of difficulties in the application. Radium was then resorted to under general anaesthesia. Seven applications at 8-day intervals. The preparation employed contained five milligrammes of bromide of radium. It was applied directly to the temporal part of the globe. The first application was for 30 minutes, the remainder for 60 minutes, that is 6½ hours altogether. After this treatment gradual flattening took place and the neoplasm did not recur up to September, 1923, when last seen. There was, however, a considerable cicatricial ptosis.

ERNEST THOMSON.

(3) **Boulans, A. (Paris).—Regarding sarcomata of the conjunctiva, with reference to a case of perithelioma. (Des sarcomes de la conjonctive à propos d'un cas de périthéliome.)** *La Clin. Ophtal.*, February, 1924.

(3) The chief interest of the case of perithelioma related by **Boulans** is that it developed in a young man of 23 years from a pre-existing small congenital naevus of the conjunctiva. The tumour, coming under observation at an early period of its development, was easily removed by a single snip of the scissors. The remainder of the paper is taken up with the histological details of such tumours and with the clinical details of their appearance, the differential diagnosis, and the prognosis and treatment. The diagnosis is often difficult without a histological examination. The prognosis varies according to the presence or absence of deep adhesion and according to the situation, whether on the limbus or not. The treatment is purely surgical and varies, according to circumstances, from simple ablation of the tumour on the one hand to exenteration of the orbit on the other.

ERNEST THOMSON.

(4) **Fietta, P. (Fribourg). — Retrobulbar carcinoma of sinus origin. (Carcinome rétro-bulbaire d'origine sinusienne.)** *Rev. Gen. d'Ophtal.*, March, 1924.

(4) A rare case of carcinoma in a girl of 17 years is reported by **Fietta.** The nature of the disease was not proved until it was too late for operative treatment, and the girl died at home without an autopsy being performed. Details of the exact sites and origin of the tumour are therefore wanting but it is supposed to have started in the maxillary sinus, extended deeply towards the cranial cavity and secondarily invaded the orbit and sphenoidal fissure.

ERNEST THOMSON.

(5) **Knight, Mary S. — Melanotic neoplasms of the eye.** *Jl. Amer. Med. Assoc.*, October 4, 1924.

(5) **Dr. Knight,** who is a Fellow in Ophthalmology of the Mayo Foundation, adduces evidence in favour of the view that melanotic sarcomata of the choroid are ectodermal in origin. She says in her summary :

"Wherever studied, melanin has been produced by ectodermal cells. In the fetus, the pigment granules in the eye are produced by the pigmented epithelium of the retina, which develops from the ectoderm. The choroid is of mesodermal origin, and the cells of the choroid do not produce pigment. Fibroblasts have been seen to phagocytose pigment granules in vitro. We may assume, therefore, that the chromatophores of the choroid are mesoblastic cells that have engulfed melanin. They merely carry pigment, which ectodermal cells have produced. Therefore, tumours capable of producing pigment arising in the eye should be called melano-epitheliomas. Melanin is a product of well differentiated cells, and, therefore, is not produced by rapidly growing cells, which accounts for the lack of it in rapidly growing tumours of the eye. The cells in the slower growing melano-epitheliomas develop the characteristics of epithelial cells and produce abundant melanin."

A. F. MACCALLAN.

(6) **Johnson, Frederick M. (New York City).—Treatment of carcinoma of the conjunctiva with radium.** *Amer. Jl. of Ophthal.*, August, 1924.

(6) **Johnson** states that most cases when first seen are obviously limited to the tissue of origin and that perforation of the globe is a comparatively rare and late occurrence. That the limbus is the commonest site of origin is explained by the following considerations :

1. Epithelial transformation occurs at this point.

2. There is a liberal blood supply.

3. There are normally some down-growing processes of epithelium in this situation.

There are two main types of growth:

1. Acanthoma, consisting of adult squamous cells showing cornification and pearl formation subdivided into:

(*a*) A slow growing variety, at first papillomatous.

(*b*) A variety showing rapid growth, early ulceration, no papillomatous stage, prompt recurrence after removal and a tendency to the formation of metastases. The cells of some of these growths are so atypical as to resemble sarcoma cells.

2. Basal cell carcinoma which is rare and recurs less frequently after excision.

Reports are given of seven cases, the ages varying from 13 to 84 years. Treatment was at first carried out with filtered radium, which was thought to give rise to lens opacities. Later, small glass bulbs containing emanation only were used, unfiltered, and gave better results. Dosage was regulated by the requirements of the case—as a rule 250 millicurie minutes brought about complete regression in a tumour 3 millimetres thick over an area of 0.7 centimetres. Four areas were treated at a time and three weeks allowed to elapse before completing the radiation. Regression was complete in four weeks.

The results in the seven cases quoted are remarkable. In six of them there was complete regression with no sign of recurrence for periods up to six years. In one case, however, the patient did not come up to her full course, but went to another hospital where the eye was excised, with the result that an orbital recurrence followed, which was treated by exenteration followed by radiation.

A description of the bulb method is to be found in the *American Journal of Roentgenology*, Vol. IX, No. 1, Jan., 1922. Its advantages are:

1. Very accurate application with a short exposure period.

2. The rays being unfiltered, soft beams give the desired superficial effect before a harmful quantity of hard rays enters the orbit.

F. A. WILLIAMSON-NOBLE.

IV.—COLOUR PERCEPTION

(1) **Verrey, Arnold (Lausanne).—The examination of colour perception and our federal authorities. (L'examen de la perception colorée et nos administrations fédérales.)** *Rev. Gén. d'Ophtal.*, September, 1923.

(1) **Verrey** deals with the use of the anomaloscope of Nagel in the examination of candidates for employment in, and of those actually employed in, the service of the Swiss Railways, especially the railways of the First Arrondissement. He considers this instrument the best for the purpose and deals with a number of criticisms which have been made in regard to it. The value of the anomaloscope in the detection of the different forms of colour defect is discussed and illustrated. Tables are appended showing the relation between the errors made in the detection of actual signals and the defects found by the instrument. The article should be read by those interested in or engaged upon railway work. They will, however, find no mention of British practice.

ERNEST THOMSON.

(2) **Taylor, G. H.—The psychology of Colour.** *Med. Jl. of Australia*, May 17, 1924.

(2) **Taylor** has noticed a want of expression in the faces of colour-blind men; also that the voice is wanting in emotional quality. He states that he has never met with a colour-blind man who was also tone deaf. This must be merely chance as the reviewer examined such a case very recently.

A. F. MACCALLAN.

(3) **Ferree, C. E. and Rand, G. (Brynmawr, Pa.)—The effect of intensity of stimulus on the size and shape of the colour fields and their order of ranking as to breadth.** *Amer. Jl. of Ophthal.*, June, 1923.

(3) **Ferree and Rand** summarizing their investigations state that:

1. The sensitivity to a given colour falls off at different rates towards the periphery in the different meridians. Hence a decrease in the intensity of the stimulus light causes the field to contract by different amounts in the different meridians or to change its shape.

2. Over some regions in the periphery of the retina the sensitivity to red is greater than to blue and at others in the same meridian the reverse of this is true. Here again it is obvious that a change in intensity of the light value of the stimuli is sufficient in itself to cause alteration in the order of ranking of the fields as to breadth.

Later in the paper it is shown that the variation in the daylight illumination of a well-lighted room is quite sufficient to effect this change. For example, decrease of the illumination from 51 to 3-foot candles narrowed the limits for red by amounts ranging in the different meridians from 11 to 37 degrees; for blue from 13 to 37 degrees; and for green from 10 to 19 degrees. Determination of the illumination of the perimeter arm in a well-lighted room on a bright winter's day gave the following values: At 1 p.m., 51-foot candles; at 2.30 p.m., 17-foot candles; at 3.45 p.m., 7-foot candles; and at 4.15 p.m. 3-foot candles. Hence if colour fields are to have any comparative value, they must be taken under standard conditions as to intensity of light and saturation of colour. Thus with a low intensity of spectral light, the fields, in order from the widest to narrowest are red, yellow, blue and green. When, however, the four colours are made equal in energy to the blue in the preceding experiment, the limits for red, yellow and blue interlace.

Care was taken to eliminate as far as possible other extraneous factors. Thus (*a*) the light was examined at the analyzing slit for impurities which when found were absorbed by thin gelatine filters; (*b*) the determinations were made with the pre-exposure and surrounding field of the same brightness as the stimulus colour at the limits and sensitivity; (*c*) the amount of light entering the eye was made independent of the size of the pupil.

F. A. WILLIAMSON-NOBLE.

V.—STRABISMUS

Inman, W. S. (Southsea).—An inquiry into the origin of squint, left-handedness and stammer. *Lancet*, August 2, 1924.

It is extremely difficult to give a useful synopsis of Inman's interesting article. Every ophthalmic surgeon will do well to read it for himself. "The nature and origin of concomitant squint have been explained in physiological terms, but its capricious incidence indicates that further factors must be involved beyond the known physiological ones. Its mode of onset and variability in states of fear or other excitement suggest that whatever may be the influence of an error of refraction, some other factor must be at work determining the breakdown of the binocular function; but the difficulties of direct investigation of the child's mind appeared insurmountable, and for some time after my attention was drawn to such a possibility I had to content myself with observations confirming the suspicion that the deformity was

dependent upon mental states. Soon it was noticed that several squinting patients were left-handed, and further investigation elicited the fact that even when not left-handed themselves a large proportion of the children had left-handed relatives. From this point it was natural to turn to the incidence of stammering, which for many years has been considered a congener of left-handedness, and I discovered that a family history of stammering could often be obtained." That is the author's opening paragraph and contains his text. Here is the concluding paragraph: "The moral of the story seems to be two-fold: first, that these conditions (*i.e.*, squint, left-handedness and stammer) hitherto regarded as separate and unrelated, appear to be determined by defects in the personality as a whole, and secondly, that the emotional difficulties of the child in meeting social demands have an importance which has till now been hidden from all save the psychoanalyst." Between these two quotations, which seem to indicate that the author minimizes the influence of refraction error as a cause of squint, there is a large number of most interesting experiences of left-handedness and stammering in the patient or his family in which these conditions were associated with squint. The author deals with the emotional factor in stammering and squinting, and has found abundant evidence that emotion may determine both the incidence and extent of the ocular deviation. There is nothing new in this since parents have been telling us for years that the squint appeared in the child as the result of emotional or nervous shock of some kind or other. It is probable that few ophthalmologists will dispute the reality of the influence of emotion in the causation of squint, but, after all, squint is essentially (though of course not invariably) associated with ametropia and ametropia is an anatomical defect of the ocular form. Shock or emotion does not usually produce squint in emmetropic eyes but these are factors in the causation of squint when the natural stimulus to fusion is lowered by the indistinctness of one retinal image. Those who seek to associate squint with left-handedness, stammer, tuberculosis or any other condition must, it seems to the reviewer, be prepared to admit that ametropia is the essential factor and that the association is therefore anatomical rather than psychological. That squint may be hereditary no one can doubt, but the reviewer suggests that what is hereditary is the shape of the eye. Emotion or shock may be the determining cause of the squint, probably generally is the determining cause, but the underlying cause is the ametropia. Inman says: "I have been able to collect 1,000 cases of squint, very few of which have failed to reveal the existence of left-handedness or stammering in some near relative, and it is hoped that the typical instances quoted will be of sufficient significance to justify the absence of statistical

proof of the association." It is just here that the author fails, and one can but associate oneself with the leader-writer in the *Lancet* when he writes as follows: "The suggestion of a predominant emotional factor opens up such possibilities, not merely of clinical benefits but also of wider understanding of general principles, that Dr. Inman's evidence should be closely examined. His attempt to establish the relationship of the three conditions should be capable of statistical examination, but it is obvious that controls on a large scale are necessary. We must count the misses as well as the hits, a precaution too often not observed by that increasingly numerous body of writers who found their judgments on the comparison of figures." Will Dr. Inman continue his most interesting study by inquiring into the family and personal history as regards left-handedness and stammering in 1,000 refractions of children who do not squint?

ERNEST THOMSON.

VI.—MISCELLANEOUS

"E. R. A."—*Jl. of Amer. Med. Assoc.* September 20, 1924.

The Scientific American has recently published the report of a committee which investigated the so-called Electronic Reaction of Abrams, and it may be useful to ophthalmologists to be able to quote its findings to patients, or friends, who extol or wish for information about E. R. A.

The investigation which this magazine instituted was carried out by a committee composed of the following men: Austin C. Lescarboura, managing editor of *The Scientific American*, a member of the American Institute of Electrical Engineers, and a specialist in electrical and radio work, acted as secretary for the committee, did the major part of the investigating work and prepared the articles that appeared; J. Malcolm Bird, one of the Associate editors of *The Scientific American* and for some years a teacher of mathematics at Columbia University; Robert C. Post, a civil engineer and a member of a well-known firm of structural steel engineers and contractors; Dr. Walter C. Alvarez, well-known as Associate Professor of Research Medicine in the University of California and a man who had done considerable research work; Dr. William H. Park, Director of the Bureau of Laboratories of the New York Health Department and consulting Bacteriologist both for the New York State Department of Health and also for the United States Quarantine Service.

This committee spent more than a year in examining the so-called "electronic reactions" and their application in diagnostic and therapeutic work. It studied the technique in detail; attended numerous demonstrations and the members submitted themselves to Abrams' diagnosis in order to learn how the latter appeared from the patient's point of view. The committee procured the genuine Abrams' apparatus for first-hand study and experimentation; it made tests with a number of Abrams' disciples for the purpose of determining the accuracy of the so-called reactions and, in short, it kept in touch with the "electronists" from its high priest Albert Abrams until the time of his death down to the most obscure "E.R.A." practitioner. Nor was this all. The committee studied alleged cures, maintained a voluminous correspondence with those who claimed to have been benefited by the "electronic treatment" and in fact, carried on the very kind of investigation that Abrams himself asked for—but never expected or desired to get.

And the results of this exhaustive investigation is expressed in the opening paragraph of *The Scientific American's* latest and final article:

"The so-called electronic reactions of Abrams do not exist—at least objectively. They are merely products of the Abrams practitioner's mind. The so-called reactions are without diagnostic value. And the Abrams' oscilloclast, intending to restore the proper electronic conditions in the diseased or ailing body, is barren of real therapeutic value. The entire Abrams' electronic technique is not worthy of serious attention in any of its numerous variations. At best, it is all an illusion. At worst, it is a colossal fraud."

A. F. MACCALLAN.

BOOK NOTICES

Sémiologie Oculaire. Le Diaphragme irido-ciliaire, Anatomie Physiologie, Pathologie. By PROF. FELIX TERRIEN. Paris Masson et Cie. 1924. Pp. 234, 123 illustrations.

This is the second volume of a series of monographs by the same author. Its general arrangement is very similar to that of the preceding volume "La Calotte Cornéo-sclérale," a notice of which appeared in this journal in December, 1923. A third volume on the Crystalline Lens is announced as in preparation.

The *irido-ciliary diaphragm* is held to include all that part of the uveal tract anterior to the ora serrata, and is dealt with under the three headings: anatomy, physiology, pathology. The

section on anatomy and physiology is followed by one on the functional disorders of the diaphragm, *i.e.*, of the nerve and muscle constituents of the iris and ciliary body, which affords a clear and instructive account of these anomalies. The remaining four sections are devoted to diseased conditions of the iris and ciliary body and include inflammatory and traumatic lesions, tumours, and a chapter on variations in ocular tension.

Terrien's reputation as a writer on ophthalmic subjects is well maintained in this volume, which is clearly written, and though full of detail is nowhere overloaded. While a monograph on a section of an organ allows the writer ample scope in the description of the manifestations of disease of that particular area, it places him in difficulty when treating of disorders which appertain to the organ as a whole. Two such instances in this volume are, the shadow test for refractive errors, and sympathetic ophthalmitis.

The book is liberally illustrated. Most of the illustrations are good, though there are exceptions, *e.g.*, Figs. 50 and 119. A comprehensive table of contents is appended.

Diseases of the Eye: A Handbook of Ophthalmic Practice for Students and Practitioners. By GEORGE E. DE SCHWEINITZ, M.D., LL.D. (Pennsylvania), Sc.D. (Michigan). Professor of Ophthalmology in the University of Pennsylvania, etc., etc. Tenth edition, with 434 illustrations and 7 coloured plates. London and Philadelphia: W. B. Saunders Company. 1924. Pp. 865. Price, cloth, 50s. net.

Any text-book which has passed through ten editions almost speaks of its popularity and excellence for itself. This work is undoubtedly one of the best, if not the best, American handbook on ophthalmology. It was last revised in 1921. The new edition contains considerable additions and alterations bringing it thoroughly up to date. These comprise an account of new methods of illumination such as Gullstrand's slit-lamp and red-free light; agricultural conjunctivitis; uveal parotitis; temporary amaurosis in infants; and operations on the extraocular muscles, etc. Modern ideas of irido-cyclitis and retinal angiosclerosis have also been added.

Among so many good chapters, those devoted to inflammation of the uveal tract are particularly good, and the diseases are very fully described. On the other hand, the chapter on "Cataract" is somewhat short, although it contains all the essential points. It states on the authority of van Duyse and Danis that a splinter of iron near the lens may cause siderosis. The reviewer doubts whether this can occur without perforation of the lens capsule having taken place. In siderosis of the lens the piece of iron is usually found within it. Under "Diseases of the Vitreous," a

drawing (Fig. 219) of a very remarkable formation of new blood-vessels in the vitreous is shown. It is not of the type usually seen and must be of very rare occurrence, unless the picture is somewhat misleading. There is rather a deficiency in pathological illustrations. For instance, under "Diseases of the Retina" there is only one such illustration, that of a globe containing a glioma; considerable help is given to the student when the histological conditions associated with the disease described are shown.

The book is well printed and easy to read, but the text is somewhat hampered by a number of names, which although gratifying to the individuals quoted who read the book, is of little service to the student, since there are no references appended. The black and white illustrations on the whole are good. The coloured illustrations of the fundus suffer badly from want of depth of colour and might be much improved upon. There is a very complete index.

Sur les Lésions de L'Appareil Visuel dans les Guerres Balkaniques, 1912-1919. By DR. C. PASCHEFF, Prof. de Clinique Ophtalmologique à la Faculté de Medicine de Sofia.

This work is composed of many clinical histories of war injuries, appropriately grouped; each group being preceded by the author's brief generalizations or explanations.

The first half comprises lesions of the extracranial visual apparatus; the latter half intracranial lesions together with two detailed cases of injuries to the thyriod and pituitary respectively.

There is an interesting series of cases of macular degeneration due to concussion of the globe from projectiles passing in its vicinity. A case is described in which sympathetic irido-cyclitis did not develop though a rifle bullet penetrating the ciliary region remained *in situ* for six months.

Among the varied hemianopsias described are two cases of symmetrical annular scotomata from occipital lesions. Another case (Obs. IV, page 99) in which, with a localized lesion of the right occipital region, only paracentral symmetrical portions of the right visual fields together with both maculae remained intact, would appear to support the theory of bilateral cortical representation of the maculae. The book is very interesting and will well repay perusal.

Transactions of the Ophthalmological Society of the United Kingdom. Vol. XLIV. Pp. 452 with 18 plates and 43 text illustrations. London: J. & A. Churchill. 1924.

The last volume of the "Transactions of the Ophthalmological Society," though, owing to the absence of a Bowman lecture, on a less magnificent scale than the preceding one, is full of

sustained interest. An interesting discussion on the physiology and pathology of the pupil reactions was opened by Sir John Parsons, Professor Edwin Bramwell and Mr. R. Affleck Greeves. Any useful abstract of the opening papers or the discussion would take up too much space; these must be read in the original, and, although the whole report only occupies 45 pages, it will be found to require careful attention. Among the numerous other papers of interest, we should like to draw special attention to that by Miss Ida Mann on Coloboma Iridis and its Embryology, with its numerous excellent plates. Included in the volume is a report of the Oxford Ophthalmological Congress of 1924, and also reports from the Midland, North of England, and Irish Ophthalmological Societies. We hope to give abstracts of some of the more interesting papers at a later date.

Ultra-Violet Rays in the Treatment and Cure of Disease. By PERCY HALL. With introductions by Sir Henry Gauvain and Leonard Hill, F.R.S. Pp. 110 and 20 plates. London: Wm. Heinemann (Medical Books), Ltd. 1924 Price, 7s. 6d.

This book is intended to serve as a handbook for the use of the ultra-violet rays in general therapeusis. As pointed out by Leonard Hill in the introduction, we have in ultra-violet radiation a valuable means of raising the bactericidal power of the blood. In addition these rays produce alteration of electrical charge resulting in changes in the aggregation of colloidal contents of the living substance of the deep epidermic cells, and, in consequence, there follows erythema, and increased exudation of lymph and white corpuscles. The author gives an account of Rollier's "Sun-Cure" Institution at Leysin and then goes on to describe the artificial methods of imitating sunlight and of producing ultra-violet radiation. He comes to the conclusion that ultra-violet radiation can be quite well compared to heliotherapy, and that the rules laid down by Dr. Rollier as to exposure can be usefully studied and applied, with suitable modification, in the treatment of patients by ultra-violet radiation. The latter part of the book gives an account of the various complaints in which the author has found the radiation of use. Skin diseases and general defective nutrition seem to give the most conspicuously successful results. The only eye cases mentioned are some good results obtained in the treatment of superficial corneal opacities by Menzies, a case of corneal opacity following a penetrating septic wound which healed completely, and a case of iritis in which some improvement was obtained. No evil results were recorded. Any surgeon desirous of making use of the treatment will find full instructions clearly expressed in this book.

CORRESPONDENCE

MEDICAL TREATMENT OF CATARACT

To the Editor of THE BRITISH JOURNAL OF OPHTHALMOLOGY

SIR,—Since reporting my cases of spontaneous absorption of cataract I have observed one more. Mr. G. Victor Miller's very interesting confirmatory cases will help much in showing up the truth. I think we are able now to put my theory on to a firmer basis: that degeneration and regeneration are at work. At the extremely interesting slit-lamp course at Oxford at Christmas I had the privilege of learning from Mr. Harrison Butler's lucid lectures and lantern slide projections of his pictures drawn from actual cases, as from Dr. Franceschetti's direct messages of Prof. Vogt's investigations, that one form of degeneration and restitution can actually be studied with the slit-lamp. I refer to those cases, where certain lacunae or fluid-gaps form in the cortex near the capsule, and are seen to disappear. Such pathological processes, taking place within the area of the pupil, would affect vision for the worse. Then closing up, it would improve. We must not say that, because medical treatment so far is very unconvincing, it can never be otherwise. It is conceivable that therapeutic remedies will be found whose efficacy in promoting restitution will prove to be above suspicion.

Yours faithfully,

GEORGE YOUNG.

COLCHESTER.

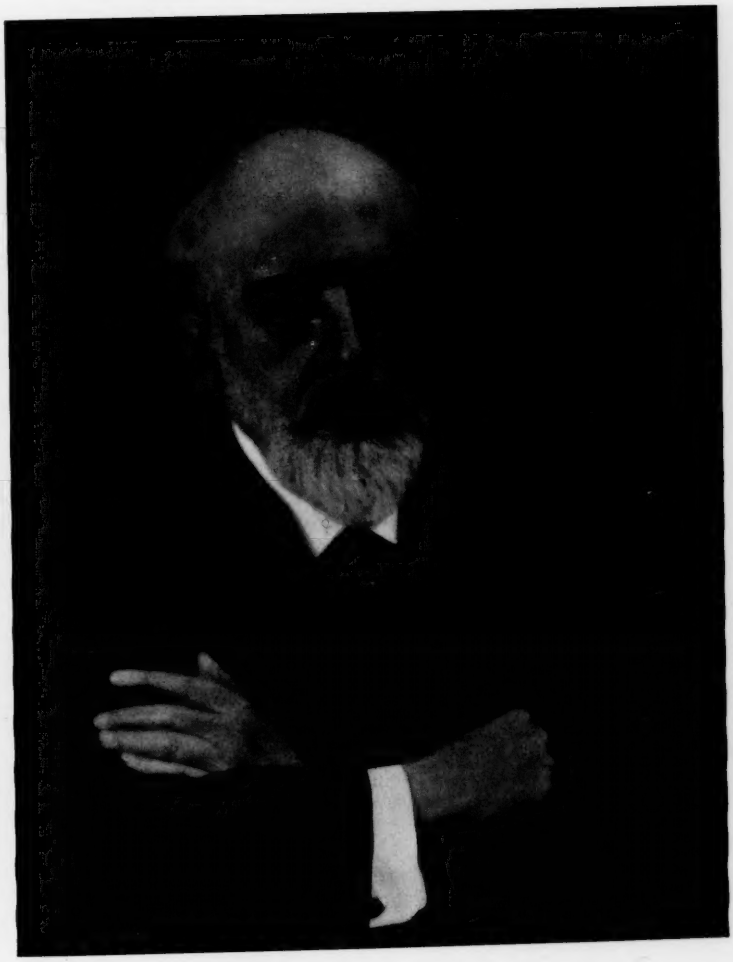
January 15, 1925.

OBITUARY NOTICE

SIR ANDERSON CRITCHETT, BART., K.C.V.O., F.R.C.S.E.

Surgeon-Oculist to the King.

THE death of Sir Anderson Critchett on Monday, February 9, removes from the ranks of British ophthalmologists one of its best known and best loved figures. For years he has been looked up to and respected as the doyen of eye surgeons, and he has filled with distinction every post of honour which his colleagues could confer on him. For close on a century the name of Critchett has been associated with ophthalmic surgery. His father, George



SIR ANDERSON CRITCHETT, BART., K.C.V.O., F.R.C.S.E.
SURGEON-OCULIST TO THE KING.

Critchett, qualified in 1839 and was one of the founders of modern ophthalmology in England. Bowman, Hutchinson, Lawson and Critchett were the great names in the ophthalmic world in the middle of last century, and George Anderson Critchett, the eldest son of the last-named, born in 1845, was approaching manhood when the discovery of the ophthalmoscope opened up a new era in the study of diseases of the eye. His father achieved a great reputation in his day, and it is not always an easy matter for a son to follow in his father's footsteps, but, in the case of Anderson Critchett, it is safe to say that he added lustre to a name that his father had already made famous.

He received his early education at Harrow and retained to the end the greatest love for and pride in his old school. The cheers with which he was greeted when he went to Harrow on Speech Day in the summer of 1908, after he had been made a Baronet, gave him more happiness than almost any other recognition of that honour. At Harrow, he won the prize for English Literature and though he did not actually gain a place in the eleven, he laid the foundations of a good cricketing style which served him well when, later on, he went up to Caius College, Cambridge. At Caius, he captained the cricket eleven, and made many friends. He graduated in 1867 and immediately after began to study medicine at the Middlesex Hospital and qualified in 1872. There followed a period in his career when it seemed almost doubtful whether medicine or music should claim him. He possessed a fine baritone voice and a love for the drama and social qualities which all acted together to draw him away from the serious profession of medicine. His affection for his father and his desire to be of assistance to him proved an effective counterbalance to these attractions and from that time onwards he seriously devoted himself to the study of ophthalmology. He speedily began to acquire a wide reputation and it is of interest to note that his first published paper on "Inoculation in Ophthalmic Practice" was published in a French journal *Annales d'Oculistique* in 1877.

In 1879 he became ophthalmic surgeon to the Royal Free Hospital and in 1881 he was elected out of a strong field of candidates ophthalmic surgeon to St. Mary's Hospital, and it was his work there that finally established his reputation and incidentally built up one of the biggest eye clinics at any of the general hospitals in London. Critchett himself would be the first to recognize how much he was aided in his work at St. Mary's by the late Henry Juler and how loyally they worked together when, a few years later, Juler was co-opted as his colleague.

His career from now onwards is a simple record of increasing honours accorded to him. In 1889 he was elected President of the

Ophthalmic Section of the British Medical Association. In 1894, at Edinburgh and again in 1899, at Utrecht, he was elected an honorary President of the International Ophthalmological Congress. From 1899 to 1901 he was President of the Ophthalmological Society of the United Kingdom. He became Surgeon-Oculist to King Edward VII in 1901, and was knighted in the same year. In 1905, King Edward created him a Commander of the Victorian Order, and in 1908, he was raised to the rank of Baronet. In 1912, when a new section of ophthalmology was started in the Royal Society of Medicine, he was the first President. In 1913, he was President of the Section of Ophthalmology of the International Medical Congress at London and in 1918, on the foundation of the new Council of British Ophthalmologists, he was elected the first President of that body. In 1919, in recognition of his war services to King George the Fifth Hospital, he was made a Knight of Grace of the Order of St. John of Jerusalem, and in the same year was created a K.C.V.O. Last year, 1924, he was elected Master of the Oxford Ophthalmological Congress, of which body he had previously been Honorary Treasurer. Such a record by itself must show the esteem in which Sir Anderson Critchett was held by those who knew him best, an esteem which could only be earned by the genuineness of character which gave rise to it.

He was never a prolific writer, to the regret of many of his pupils, and much of his teaching which would have been of great value is lost for want of recording; but he was a great clinician and unrivalled as an operator. To see Critchett removing a cataract in the heyday of his skill was to see the perfection of operative technique. Never a hurried or purposeless movement was made and if any untoward complication had to be met, it was faced with the same steady placidity as if it had been foreseen from the first. To the very end of his life he retained this dexterity and within a few weeks of his death he was still operating as skilfully as ever.

An old friend and colleague, writing in *The Times* of February 10, says of him: "His other great claim to remembrance is the affection and regard which he inspired universally with patients and colleagues. His kindness to his junior colleagues was proverbial. His loyalty to those who brought him patients in consultation enabled them to do their best for their clients. This sincerity and uprightness of character gained for him the affection of patients of all classes." He had to a very high degree the capacity of rousing in his patients a feeling of complete confidence and the equally valuable capacity of creating a feeling of friendship in his colleagues. Apart from his work, probably this was

his most characteristic trait; an essential friendliness of spirit arising from a genuine and unselfish interest in the other man. It is little wonder that he had such a wide circle of friends, and that his presence was welcomed in so many different spheres. He had a ready wit and a happy art of turning a phrase, and even a delight in an old-fashioned paronomasia. He was never afraid to make a pun after dinner or when suddenly called on for any complimentary speech, but he always, as he himself said not very long ago, remembered that his duty in proposing the health of a guest was "to toast him, not to butter him." He was at his best when the party was not too large and when there was someone nearly contemporary present to help to prompt his memory of old days and ways. As he said of himself, he was a "clubbable" man.

To few men has it been given to have such a happy and such a full life; happy in his work, happy in his friendships and happy beyond expression in his family life, he reached the end of his long term of years without ever growing old.

NOTES

Appointment

DR. E. K. ROY-THOMAS has been appointed Honorary Assistant Ophthalmic Surgeon to the Swansea General and Eye Hospital.

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Visual Tests in the Air Services

OPHTHALMIC Surgeons who are interested in the tests of vision employed in the Air Services will find these fully detailed in the *Lancet* for November 29, 1924, by Dr. Kenneth R. Smith, late of the R.A.F. Medical Service.

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British Medical Association

THE Ninety-third Annual Meeting of the British Medical Association will be held at Bath, from July 21 to 24, 1925. The officers of the Ophthalmic Section are as follows:—President: W. Mardon Beaumont (Bath). Vice-Presidents: R. Wallace Henry, M.D. (Leicester); A. W. Ormond, C.B.E. (London); C. H. Walker (Bristol). Honorary Secretaries: R. Colley, M.B., D.O.M.S., 30, The Circus, Bath; P. G. Doyne, M.B., 8, Harley St., London, W.1.

Société française d'Ophtalmologie

THE preliminary programme of the meeting to be held in Brussels is as follows:—May 9.—Afternoon: tour of the town under the direction of Prof. Van Kalken. Evening: Reception by the Société belge d'Ophtalmologie at the Arts Club. May 10.—Excursion to Bruges, leaving Brussels at 9 a.m. returning about 8 p.m. May 11.—Forenoon: Opening séance at the Palais des Académies, honoured by the presence of H.M. the Queen of the Belgians; first session of the Congress. Afternoon: Excursion to Malines; Carillon concert; reception in the Archbishop's garden. May 12.—Forenoon: Second Session of the Congress; discussion of Prof. Lagrange's report on the "Treatment of Infantile Glaucoma." Afternoon: Papers. May 13.—Forenoon: Third session of the Congress. Afternoon: Reception at the Hôtel de Ville. Evening: Banquet at the Taverne Royale. May 14.—Final session of the Congress. All particulars may be obtained from Dr. René Onfray, 6, Avenue de la Motte-Picquet, Paris, VII; or Dr. M. Danis, 7, rue Montoyer, Brussels.

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Helmholtz's Treatise on Physiological Optics

In connection with the review of Vol. I of this important translation noticed in our last number we are asked to state that the book is not on sale by the regular booksellers. The price is seven dollars per volume, and orders should be sent to Prof. F. K. Richtmyer, Secretary of the Optical Society, Cornell University, Ithaca, N.Y., U.S.A.

FUTURE ARRANGEMENTS

1925.

March 6.—North of England Ophthalmological Society, at Sheffield.

March 13.—Section of Ophthalmology, Royal Society of Medicine (Clinical).

April 7.—Midland Ophthalmological Society, at Leicester.

May 8.—Section of Ophthalmology, Royal Society of Medicine.

May 9-14.—Congrès de la Société française d'Ophtalmologie, at Brussels.

June 2.—Midland Ophthalmological Society, at Oxford.

June 12.—Section of Ophthalmology, Royal Society of Medicine (Annual).

July 14-17.—Convention of English-speaking Ophthalmological Societies, in London.

July 21-24.—British Medical Association, at Bath.

October 6.—Midland Ophthalmological Society (Annual), at Birmingham.